IMPACT OF STRUCTURAL ADJUSTMENT POLICIES ON THE FISHERIES SECTOR IN DEVELOPING COUNTRIES

SENEGAL, CHILE, AND THE PHILIPPINES — A PRELIMINARY ASSESSMENT

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Impact of structural adjustment policies on the fisheries sector in developing countries

Senegal, Chile, and the Philippines — A preliminary assessment

HKL & Associates Ltd

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I INTRODUCTION AND TERMS OF REFERENCE

1 Background to the study

Economic crises have plagued countries in Africa, Latin America and Asia since the early 1980s. International donors and financial institutions, led by the International Monetary Fund (IMF) and the World Bank, responded by requiring certain policy changes as a condition of further lending. These conditions are now formalised in the various Structural Adjustment Programs (SAPs) currently being followed by many Third World Countries.

While there are many studies of the impacts of SAPs, the majority consider macro-economic impacts only; few have evaluated impacts at the sectoral or micro levels. It is at this level that CIDA, ICOD and IDRC decided that this study should be focused. The fishery sector was chosen because, in most Third World countries, fish are an important source of animal protein for large numbers of people, and fish products contribute significantly to foreign exchange earnings.

2 Terms of Reference and Approach to the Study

The detailed terms of reference are to be found in Appendix I. The overall objective of the study is to evaluate the impact of structural adjustment programs on the fishery sector of Third World countries, with specific reference to Senegal, The Philippines and Chile. The study begins by outlining the importance of the fishery sector in the world economy and by reviewing the development of the sector in recent years. Specific attention is paid to problems facing the fisheries sector in Third World countries. This is followed by a review of what structural adjustment policies are designed to achieve, the policy instruments involved and the debates concerning their desirability and efficacy. The possible implications of structural adjustment programs for the fisheries sector are then analyzed in schematic terms and this analysis provides the framework for the three case studies.

Each case study begins with a review of macro economic developments in recent years, a description of the contents of structural adjustment programs, and an assessment of their accomplishments. There follows an overview of the structure and importance of the fisheries sector, and a preliminary assessment of how structural adjustment programs might have influenced developments in that sector. Finally, suggestions are made for further research in this area.

The report concludes by drawing together the main findings of each case study on how structural adjustment policies might have affected the fisheries sector.

Given the tight deadlines in which this study had to be completed and the limited resources available, it was intended that it would draw only upon secondary sources of information, complemented by short visits to each country both for data collection and interviews with knowledgeable persons. Each Canadian researcher had a local contact in the field to assist in collecting information and in making contacts.

The intention is that this preliminary evaluation will be followed up by more focused research in the field, drawing more extensively on local expertise, on the areas identified for further study.

II SUMMARY OF FINDINGS - THE IMPACT OF STRUCTURAL ADJUSTMENT IN FISHERIES

Structural Adustment Programs (SAPs) are usually introduced as a way of handling the pressures of an increasingly adverse balance on the external account; bankers and other lenders seek the *imprimateur* of the IMF/World Bank before easing repayment terms/advancing new funds. The major foci of SAPs are the external balance, and the linked internal balances between both savings and investment and between government revenues and government expenditures, as a prelude to growth in real income. As the role of the market is paramount in SAPs, a corollary - which critics would argue is the main objective - is to integrate Third World more closely into the world market economy. The major policy areas and instruments used in SAPs are:

> **restraining demand:** by increasing interest rates; tightening credit; restraining wages; reducing government spending by cutting services; employment and subsidies; increasing tax collections; and, where imports exceed exports, devaluation;
>
> **getting prices right:** ending price controls and subsidies, removing import controls and lowering tariffs (so that "world prices rule"); ending state monopolies; and devaluing "overvalued" currencies;
>
> **institutional/sector reforms:** removing institutional restrictions on the freedom of capital to invest in any sector; privatization; reducing and simplifying the role of the public sector in day to day business decisions of the country and so on.

In the last few years the Bank has recognized the social impact of adjustment and has attempted to work in measures for job creation for those most affected, and provisions for redundancy payments, retraining etc. to mitigate these adverse impacts.

In section IV of this report we analyze in detail how the fishery sector of an economy could react to SAP measures; here we note some of the major effects seen in the countries we visited.

SENEGAL

1. Fish production has increased strongly since 1982, which coincides with the introduction of reform programs.

2. Most of the increase was accounted for by artisanal fishers, whose numbers also increased steadily after 1984. By 1989 they accounted for 71 percent of total production.

3. Since 1983 there has been a steady increase in the dollar value of fish exports, accounted for mainly by the industrial fishery. Fish now earns about 28 percent of total export revenue.

4. The expansion of artisanal production may be related to structural adjustment through easing of foreign exchange constraints and restored economic growth but other factors played a role e.g. easing of competition with industrial fishers in the early 1980s and provision of credit for motors.

5. Export promotion was essentially through subsidies and tax exemptions. Since the artisanal sector was producing essentially for local consumption they were not, until recently, affected much by these incentives.

6. Recently, however, the increased production of fish seems to be reaching natural limits. Some species are already recognized as being overfished, but given the poor data and the known problem of illegal fishing, it is likely that limits are being reached or exceeded for other species.

7. Cutbacks in government spending due to structural adjustment have undermined the ability of the state to monitor and police the fisheries code.

8. Resource pressure finds expression in stagnant or declining productivity, especially in the industrial sector, and in growing competition between the two sectors. Industrial processors are, reportedly, increasing their purchases from artisanal fishers.

9. Fish consumption per capita is high but varies greatly from region to region. It is also reportedly falling.

10. The real value of the artisanal catch per ton fell steadily from 1982 to 1988 due, perhaps, to expanded supply, and the real value of catch per canoe has fallen since 1985. The net returns to artisanal fishing appear to have fallen substantially but are still high.

11. The industrial fleet is old and in poor repair. Real returns appear to have fallen significantly due, it would appear, to low productivity and relatively low fish prices. Fuel and interest costs are often held responsible, but this is unlikely.

12. The processing sector is contracting and suffers from low capacity utilization, high unit wage costs and lack of capital. The export subsidy is crucial to their continued existence but appears not to have been paid since 1989.

13. The most recent structural adjustment loan, SAL (IV) focuses on raising export incentives and "liberalizing" labour markets, both of which ought to benefit canners. Workers are, understandably, resisting.

14. The state has privatized two companies and ceased direct investment in fisheries. There are plans for new credit/guarantee institutions which are badly needed in the industrial sector. Embryonic credit schemes, with state assistance, are now in place in the artisanal sector.

15. The main concern is that if current adjustment efforts succeed in raising exports further, there will be additional pressure on the resource base and on local fish markets.

16. Further research on the impact of structural adjustment should focus on:
    - the implications for current consumption of recent export promotion initiatives;
    - the distribution of income in the fisheries sector;
    - the impact of reform on fisheries communities as a whole.

17. Government is likely to support this research. Limited local research capacity exists but there is some scope for foreign funded joint-research.

CHILE

1. The fishing industry was growing steadily prior to 1973, assisted by government incentives, but has grown rapidly since then. Structural adjustment initiatives have been implemented since that date.

2. Export promotion has been a key feature of Chile's adjustment program and has also characterized the fisheries industry.

3. Fisheries exports consist mainly of fishmeal and fresh, frozen and canned fish. Their combined value has risen almost 10 fold since 1976 to over $800 million, while tonnage has risen 5 fold to in excess of 1.1 million.

4. Local consumption of fish per capita is very low and fell during the stabilization phase of the adjustment program, as programs to distribute fish free to the poor were cancelled and as real wages fell sharply.

5. Initial government efforts focused on the development of the northern pelagic industry for fishmeal exports, and were highly successful.

6. As anchovy stocks dwindled due to exploitation and, mainly, El Niño, they were replaced by sardine and mackerel, the output of which rose rapidly. By 1987 there were signs, however, of over-exploitation.

7. Since the mid 1980s, exports of demersal species and mulloscs have grown rapidly as a result of programs to promote non-traditional exports.

8. The artisanal sector was also encouraged by credits from IDB, by rising unemployment and by settlement in the south. The catch from the south has grown in importance as that of the north has declined.

9. Harvest levels have fallen since 1988 suggesting, as in Senegal, over-exploitation of the resource.

10. Seaweed exports have risen strongly since the early 1980s, again due to export promotion. In addition, high levels of unemployment have attracted migrants from elsewhere in Chile to this industry.

11. Recently, artisanal seaweed producers have come into competition with industrial seaweed and salmon producers.

12. Aquaculture is growing rapidly under export promotion schemes.

13. The main impacts of structural adjustment have, therefore, been on increased production for export.

14. There is strong evidence that production now exceeds sustainable yield for most commercially important species.

15. Government restraint measures post 1973 led to cutbacks in fisheries management which have not yet been corrected. Lack of enforcement is, therefore, a major problem.

16. The industrial pelagic fishery has also resisted efforts to improve fisheries management.

17. Export promotion in other sectors has led to industrial pollution which is also hurting fish stocks.

18. Real incomes of artisanal fishers not affected by resource depletion have probably risen since 1975, but since there is evidence of traders' margins rising significantly, the picture is not clear.

19. IDB credits may have led to concentration of ownership in the artisanal sector.

20. Cost structures in both fishing and processing are hard to come by but are such that they respond well to export incentives. No data exists on artisanal costs for fish for local consumption but the real value of the catch has increased significantly since 1975.

21. Rapid settlement in the south, and relatively low artisanal incomes, have led to poor living conditions. Incomes of long established fishers in this region have fallen due to competition for the resource. Government services are inadequate.

22. Further research on the impact of structural adjustment should focus on:
    - the cost and earning structures of fishing and processing;
    - ownership and income distribution patterns;
    - strategies of adaptation to changes in the resource, markets, technology, etc.
    - identification of restraints on incomes of fishers, traders and processors, including women.

23. Government is likely to support such research. ICLARM has expressed an interest in co-operating with IDRC/CIDA if Canadian funds are forthcoming.

THE PHILIPPINES

1. The Philippines has been implementing structural adjustment programs since 1979, interrupted significantly by political upheavals, drought, earthquake and volcanic eruption. Success in rectifying basic imbalances has been mixed but on the whole limited.

2. Fish production has increased by 40 percent by volume since 1981 and 24 percent by value. However, once inflation is allowed for, the increase in value is only 17 percent.

3. Per capita consumption of fish is high and most production is for domestic consumption. Nevertheless, export earnings from fish increased steadily over the last decade to $500 million or to 6 percent of total exports, stimulated by devaluation.

4. Most exports are of canned fish but exports of shrimp/prawns have expanded rapidly since 1985 as a result of investment in their farming.

5. Fish production increased in all years except 1983-86 which were years of political upheaval and IMF austerity.

6. Fish consumption per capita stabilized, on average during the 1980s, but survey evidence suggests reduced consumption for all but fishermen, due to the increasing price of fish relative to other sources of protein. But population growth in excess of 2.5 percent per annum at that time implied rising total consumption of fish.

7. Productivity has been declining in both municipal and commercial fishing but may have risen in aquaculture.

8. The number of municipal boats rose sharply during the 1980s. So too did the number of motorized boats, assisted by World Bank credits. This has allowed increased effort but also import dependence and pressure on resources.

9. Aquaculture investment and production has risen steadily over the decade.

10. Productivity of municipal marine fishing, and the real value of the catch, have fallen steadily over the decade.

11. Municipal fishers are quite poor and rely on non-fish activities or credit from merchants during the off-season.

12. Seaweed farming, mariculture, for export has risen rapidly since the mid 1980s.

13. The catch of the commercial maritime sector, which caters to both local markets and canners, is relatively stagnant, due to the age of the ships and the decline in fish stocks. It will not be able to supply the expanded capacity for tuna canning; as a result the now seasonal dependence on imported tuna will be increased.

14. Excess processing capacity is a problem, due in part to negative real interest rates prior to adjustment.

15. Enhanced production levels and industrial and residential pollution are putting severe pressure on the fish stocks of the Philippines. Poor fishing practices, such as the use of dynamite, and the destruction of

mangrove swamps for aquaculture, are also contributing to the damage. This is affecting the catch and the efforts of municipal fishers in particular.

16. The real value of production has risen over the period only in aquaculture. It has fallen steadily in the municipal marine sector and, from 1986 in the commercial and municipal inland sector.

17. The real value of fish production per ton has fallen consistently in all sectors except aquaculture and the municipal inland fisheries which concentrate on high value species, often for export.

18. Devaluation and subsidy removal has raised the price of gas significantly, probably reducing the net returns of municipal fishermen.

19. Returns to aquaculture probably rose significantly to 1988 but since then world competition have reduced dollar prices for prawns and devaluation has failed to offset this - meanwhile input prices have risen.

20. Devaluation and increased tuna supply have encouraged the over-expansion of tuna canning capacity which, in a very internationally competitive industry with a high import content, has probably squeezed margins.

21. Seaweed farms seem to have benefited unambiguously from exchange rate changes since their import content is low and world prices firm.

22. Municipal fishers do not have access to formal credit. Those sections of the industry which do, complain about high interest rates.

23. Further research on the impact of structural adjustment should focus on:
    - how best to manage the fishery so as to reduce pressure on fish stocks as demand from local consumption and exports increases;
    - the cost and earning structures of fishing and processing;
    - ownership and income distribution patterns.

24. Government is likely to support this research. Local expertize is available for joint research projects if foreign funding is forthcoming.

CONCLUSIONS

1. Fish production and employment has grown strongly in all countries since the beginning of adjustment programs, and especially in Chile and Senegal.

2. In Senegal and the Philippines, growth has been fuelled by the domestic market.

3. Export growth and diversification has occurred in all three and has been the driving force of production in Chile.

4. In all three countries this growth is putting pressure on the resource base. Productivity is, as a result, stagnant or declining.

5. Pressure is also coming from industrial pollution.

6. Funds for monitoring and policing resource use have been cut back under adjustment programs.

7. Attributing causation is difficult but adjustment measures have been critical in Chile. Production responded to export incentives and the number of fishers rose in response to unemployment elsewhere in the economy. Austerity also reduced local fish consumption in the years after 1973.

8. In Senegal and the Philippines adjustment programs may have assisted local consumption by restoring the growth of total national income and easing foreign input constraints.

9. Other factors, such as small loan schemes, were also important in raising the output of the artisanal fishery of each country.

10. Export incentives were most restrained in Senegal due to the fixed exchange rate system and the cumbersomeness of the alternative measures put in place.

11. There are signs, however, that conflict over resource use between export and local markets is growing in Senegal.

12. Efforts to promote exports further can only heighten the pressure on the resource base in all three countries.

13. The age of the commercial fleet is a problem in Senegal and the Philippines but not in Chile where the profitability of fish for export has facilitated and encouraged new capital investment.

14. Credit is a problem in all sectors in Senegal, not addressed and possibly worsened by adjustment measures.

15. There are complaints about high interest in the Philippines, where they may be valid, and in Senegal where they do not seem to be valid.

16. Austerity measures reduced fish consumption in Chile 1973-76 and in the Philippines 1983-86.

17. Further research is needed, as elaborated in the country case studies.

III AN OVERVIEW OF THE WORLD FISHERIES ECONOMY

The world's fisheries are an important source of food, employment and income in all coastal nations. Increasingly, fish is an important earner of foreign exchange for many developing countries. Yet despite the importance of the fisheries sector in many countries, fisheries resources are being damaged due to over-fishing, pollution and habitat distruction. These problems, although evidenced the world over, are particularily severe in developing countries where there are often insufficient resources (both monetary and human) to properly manage fisheries and regulations offer inadequate protection to fisheries and fisheries habitat from pollution.

This chapter presents an overview of fisheries in terms of their relative importance in developed and developing countries. Aggregate data is presented on fish consumption, and fishery based income, employment and trade in developed and developing countries. Also examined are the important trends in fisheries in both country groups. The analysis suggests that both the developed and developing countries are facing many of the same fisheries issues, but because the significance of fisheries tends to be greatest in the poorest regions of the world, it is in these areas that these issues are most urgent.

A country's fishing industry can include inland fisheries, inshore and offshore marine fisheries, and fresh, brackish or salt water aquaculture. The fisheries sector can be divided further by type of gear used, the size of vessels, and the species harvested. Other distinctions can be made based on the ownership and the level of capital investment in vessels and equipment. Each of these characteristics has an impact on fishing costs, markets and consequent prices for production, income distribution, and the socioeconomic impacts of the industry. On a global scale however, such detailed distinctions are impossible. Instead, the world's fisheries are most often discussed in terms of three main sectors: aquaculture, industrial fisheries, and artisanal fisheries. The main features of each are described below.

Aquaculture refers to the cultivation of fish, crustaceans, seaweeds and algae. Techniques range from the rearing of fish in near-natural environments without any supplemental feeding, to high-cost systems where fish are reared in artificial environments and are totally dependent on anificial feed. Total world production of fish has grown about 40 percent since the mid-1980s and is currently estimated at about 14 million tonnes (FAO 1991 & 1989). Most of this production is in Asia where aquaculture is often integrated with agriculture and fish is an important source of food. In Africa attempts to increase fish production through aquaculture have not been as successful, while in Latin America most aquaculture production is focused on high-value species for export. In many developed countries, the need to heat the rearing environment adds to the costs of production, making it necessary to concentrate on high-value luxury species.

Industrial Fisheries are large-scale fisheries using capital intensive technology (eg. large boats, modern and efficient gear, on-board processing capacity, etc). Boats and equipment used in this sector are often owned by vertically integrated corporations and fishing is usually carried out in offshore waters. Large-scale fisheries are responsible for the greatest portion of the catch of developed countries. In the developing countries, industrial fisheries are less important, especially in terms of supplying the local food fish markets, but can be important in the supply of fish for processing into fish meal or for export.

Artisanal Fisheries are small-scale and generally use labour-intensive technology. Catches from this sector dominate Third World fisheries and are particularly important in the supply of food fish for local markets. The FAO estimates that artisanal fisheries supply 80 percent of the fish consumed in Africa, 60-70 percent in Asia, and up to 50 percent in Latin America [Regier, 1982, p. 3]. Almost all inland fisheries and most near-shore marine fisheries can be classified as artisanal. The technology used ranges from gleaning fish and seaweeds by hand to the operation of small trawlers with mechanized net lifting equipment. Also included in the artisanal fisheries is the low cost, low technology aquaculture common in Asia.

The distinction between artisanal and industrial fisheries is not always clear. In most countries, not only are there small-scale and large-scale fishing operations, but there are also many fishers employing gears that are characteristic of both. These "intermediate-scale" operations are usually classified as small or large-scale by government agencies

for administrative purposes, with the result that a vessel which is termed artisanal or small-scale in one country might be considered large-scale or industrial if operating in another country.

As with fish harvesting, the structure of the processing sector can vary from the labour intensive artisanal processing sectors, which dominate in the Third World, to large capital intensive industrial processing plants. The market systems can also vary. Fish is often simply sold directly to consumers by artisanal fishers on the beach, or it can be sold to processors or fish mongers who later sell it at local markets. In many industrial fisheries, fish is delivered to large processing plants, and payment is based on previously negotiated contracts.

1. FISH AS FOOD

Fish is a nutritious food, high in protein and containing the vitamins A, B and D, as well as calcium, iron, phosphorus, iodine and fluoride. It can make an important contribution to the nutritional status of people in the Third World because it is high in the amino acids lysine and sulphur which may be missing in cereal-dominated diets [Kent, 1987, p. 29].

Fish consumption patterns differ significantly between developed and developing countries. Table III 1 shows that although the supply of fish per person in the developing countries has almost doubled since the early 1960s, it is still only a third of the average supply available per person in the developed countries. Despite this, fish is a much more important component of diet in the poorer countries, accounting for an average of 20 percent of the (meagre) supplies of animal protein available (Table III 2) compared to 13 percent in developed countries.

Table III 1. Average per Capita Supply of Fish and Seafood in Developed and Developing Countries.

Three-Year Average	Developed Countries	Developing Countries
	(kilograms/year)	
1961-63	18.5	4.8
1969-71	22.3	6.5
1976-78	23.9	7.6
1982-84	24.5	8.1
1986-88	25.9	8.7

Source: FAO Food Balance Sheets.

The average daily requirement for protein has been estimated by the United Nations' Department of International Economic and Social Affairs Statistical Office (1977) to be 38.7 grams. Table III 2 shows the average daily supply of protein available in both developed and developing countries is well above this required level. However, averages hide important inequalities in the distribution of food supplies. FAO estimates indicate that food production is sufficient to adequately feed the world's population [FAO Food Balance Sheets, 1984-86 average], yet an estimated 20 to 30 percent suffer from severe malnutrition, and in some places even starvation [McGoodwin, 1990, p. 2, quoting World Bank Atlas].

Another important issue is the distribution of food within households. In many developing countries, the allocation of food tends to favour adult males. There is also some indication that the distribution of animal food products may be even more skewed in this direction [Kent, 1987, p. 35]. The availability of fish for food is therefore of higher significance for women and children, especially when viewed in light of the susceptibility of children to malnutrition and the higher nutritional requirements of pregnant women and nursing mothers.

Table III 2. Average per Capita Supply of Protein by Source in Developed and Developing Countries (Three Year Average 1986-1988)

	Developed Countries	Developing Countries
All protein (grams/day)	102.9 gm	59.8 gm
Animal protein (grams/day)	59.4 gm	13.2 gm
Animal protein as a percent of total	58%	22%
Fish protein (grams/day)	7.6 gm	2.6 gm
Fish protein as a percent of animal protein	13%	20%

Source: FAO Food Balance Sheets.

While the averages presented in Table III 2 do indicate a greater importance of fish in the diets of people in developing countries, they also hide some critical details. There are some island and coastal states, for example, that depend on fish for up to 90 percent of their total protein consumption [Labon, 1988, p. 5]. It is also important to recognize that because of the large populations in the Third World, the significance of fish in the diet takes on an even greater role. It has been estimated that in Asia alone, more than a billion people depend on fish for their primary source of protein [CIDA, 1986, p. 3] and in total, more than a half of the world's population depend on fish as their only source of animal protein [McGoodwin, 1991, p. 3].

2 THE ECONOMIC SIGNIFICANCE OF FISHERIES

2.1 Contribution of Fisheries to GDP

Estimates of the contributions made by fisheries to the Gross Domestic Products (GDPs) of some of the major fish producing nations of the developed and the developing world are presented in Table III 3. These estimat4es were based on information presented in Country Fishery Profiles that have been prepared by the FAO on selected countries since the 1970s. The FAO's choice of countries was intended to provide representation of nations of various sizes, stages of economic development, and geographical regions [FAO, 1972]. The countries selected for inclusion in Table III 3 are the major fish producing countries of the developed and the developing worlds for which Fishery Country Profiles had been prepared in the last ten years.

The data presented in Table III 3 indicates that the economic significance of the fisheries sector in a country's economy is more closely (and inversely) correlated with its level of economic development than with its rank in fish production. With the exception of Iceland, fisheries contribute less than one percent to the economies of the developed countries. Of the developing countries, the contribution of fisheries is greater than one percent for all but one, and greater than two percent for six of the ten. This range corresponds with an FAO estimate that the average fisheries share of GDP is three percent in the developing countries [Josupeit, 1984, p. 1].

Table III 3 Estimated Contribution of Fisheries to the Gross Domestic Products of Selected Developing and Developed Countries

	Rank in the World's Fish Production[2]	Estimated Contribution of Fisheries to GDP[1] (percent)
DEVELOPED COUNTRIES		
Japan	3	0.7
USA	6	<0.1
Denmark	12	0.4
Norway	13	0.8
Canada	15	0.7
Iceland	16	12.7
France	20	0.3
Poland	28	0.8
Italy	29	1.0
Netherlands	35	0.2
DEVELOPING COUNTRIES		
Peru	4	2.0
Chile	5	6.0
India	7	0.5
Korea	8	1.2
Thailand	9	1.7
Indonesia	10	1.8
Philippines	11	4.6
Bangladesh	23	2.4
Tanzania	36	3.2
Senegal	41	2.6

1 Fisheries GDP calculated as the estimated gross value of fish production reported in FAO Fishery Country Profiles, less 20 percent to account for fishing costs. Twenty percent is FAO's estimate of the average cost of fishing inputs for all countries, but the FAO also notes that input costs can vary significantly with the sophistication of the industry (FAO, 1972, p. 2).

2 Source: FAO Fishery Statistics Yearbook, 1988, Vol. 69.

The estimated contributions of fisheries to GDP are limited to the fish production sector. The value-added by the processing and marketing sectors can easily more than double the total contribution of fisheries to GDP, depending on the degree of processing involved in creating the fish products finally consumed.

2.2 Employment in Fisheries

Table III 4 shows the employment in fisheries for the same countries represented in Table III 3. For some of these countries, the employment estimates only included the number of people involved in fish harvesting activities. We estimated employment in the processing and marketing sectors of these countries to be equal to the numbers employed in fish production. This likely underestimates employment in the developing countries because they are dominated by artisanal fishers which have been estimated to provide work for two or three shore-based workers [Thomson, 1980, p. 4].

To compare the relative importance of fisheries as a source of employment, the number of people working in the fisheries sector are given as a percentage of the country's total labour force. This measure exhibits a pattern similar to that of the contribution of fisheries to GDP. The importance of the fisheries sector in providing employment appears to be correlated (negatively) more closely with the income of the country than with its level of fish production.

Table III 4 Estimated Employment in the Fisheries Sector of Selected Developing and Developed Countries

	Estimated Number of Persons Employed		Estimated % of Total Work Force[1]
	Fish Production	Processing & Marketing	
	(thousands)		%
DEVELOPED COUNTRIES:			
Japan	431.9	431.9[2]	1.4
USA	223.0	70.9	0.3
Denmark	14.5	10.4	0.9
Norway	28.0	200.0	11.2
Canada	81.5	25.8	0.9
Iceland	6.6	9.8	14.5
France	44.4	33.8	0.5
Poland	17.8	20.0	0.2
Italy	50.0	6.8	0.2
Netherlands	4.4	15.0	0.3
DEVELOPING COUNTRIES:			
Chile	44.6	13.7	1.4
Peru	31.2	69.0	1.6
India	2100.0	2100.0[2]	0.7
Korea	172.8	172.8[2]	2.3
Indonesia	3115.0	3115.0[2]	4.1
Thailand	300.0	93.5	1.6
Philippines	980.0	30.0	5.0
Bangladesh	1100.0	1100.0[2]	7.1
Tanzania	171.0	171.0[2]	6.0
Senegal	36.0	72.0	3.6

1 Labour Force data from: Yearbook of Labour Statistics. 49th issue. 1989-90. International Labour Office, Geneva.

2 Employment in processing and marketing data are not available; we estimated it to be equal to the number employed in fish production activities. Whether this over or under-estimates the employment in this sector depends on the level of industrialization in the country's fisheries sector. Artisanal fisheries have been estimated to create 2 to 3 on-shore jobs per fisher [Thomson, 1980, p. 4], while a highly industrial sector may provide only 1 job for every 3 fishers (eg. Chile).

The data presented in Tables III 3 and III 4 indicate that fishing dominates the economies of only a handful of countries, but hides the fact that both developed and developing countries have coastal regions that are almost entirely dependent on fishing. Communities in these regions tend to be among the most economically disadvantaged because of their remote locations and limited opportunities for alternative employment. In much of the Third World, the dependence on fisheries in these communities is especially critical because migration to other areas is unlikely to provide better employment options. Most cities are already over-crowded, due in large measure from the migration of unemployed agricultural workers. In fact, in times of economic recession the migration of people is often into fishing communities, as there is a tendency for artisanal fisheries to absorb surplus labour [McGoodwin, 1990, p. 10].

As with the distribution of fish for food, there are also inequalities in the distribution of incomes generated by fisheries. Women play a vital role in fisheries, most often in the processing and marketing of fish caught by artisanal fishers, yet the distribution of incomes within fishing communities generally favour men [Madhu, 1989, p. 3].

Gender inequalities in Third World fisheries have been perpetuated by fisheries development efforts which have often over-looked the needs of women involved in processing and marketing [King, 1989]. Until recently fishery development funds were usually aimed at increasing artisanal harvest levels through the provision of more effective fishing equipment. As men dominate the harvesting sector, they received any increases in incomes that resulted from these projects. Because in many societies there is a clear division between the use of men's and women's incomes, with the women's being used for food and other basic necessities, such programs may not

have increased the nutritional well-being of women and children [Hamilton, 1984, p. 77]. Overgeneralization on the issue of gender inequality is to be avoided, however, as in some countires e.g. in West Africa, fish mammies (women) often finance the activities of fishermen and buy their catch at concessionary prices.

The focus of fisheries development on production sometimes had other negative effects. In West Africa for example, fisheries development was successful in increasing production, but, because the processing sector could not keep up with the increased supply of fish, it also led to increases in post-harvest losses [United Nations, 1983]. It was demonstrated that development strategies aimed at improving post-catch efficiency would benefit a wider number of people through increased prices for fishers, improved incomes for processors, and possible increases in local employment [Bailey, 1980]. Recent improvements in artisanal fishing have included the processing sector, often resulting in increased incomes for women.

3 FISH AS A SOURCE OF FOREIGN EXCHANGE

World trade in fisheries products has been increasing at a pace faster than the increase in world catches. Between 1979 and 1989, the proportion of the world's catch that was traded interntionally rose from 32.8 to 38.5 percent, and the amount of fish traded increased from 21 to 38 million tonnes [FAO, 1989 and 1986]. Figures III 1 and III 2 show the growth in the value of the fish exports and imports of developed and developing countries since 1978. With the exception of the fish imports of the developing countries, trade in both country groups increased dramatically in the late-1980s. As can be seen from Table II 5, fish trade also increased in relation to all trade during this period. This is especially true for the developing countries where fish is now well over two percent of their total exports.

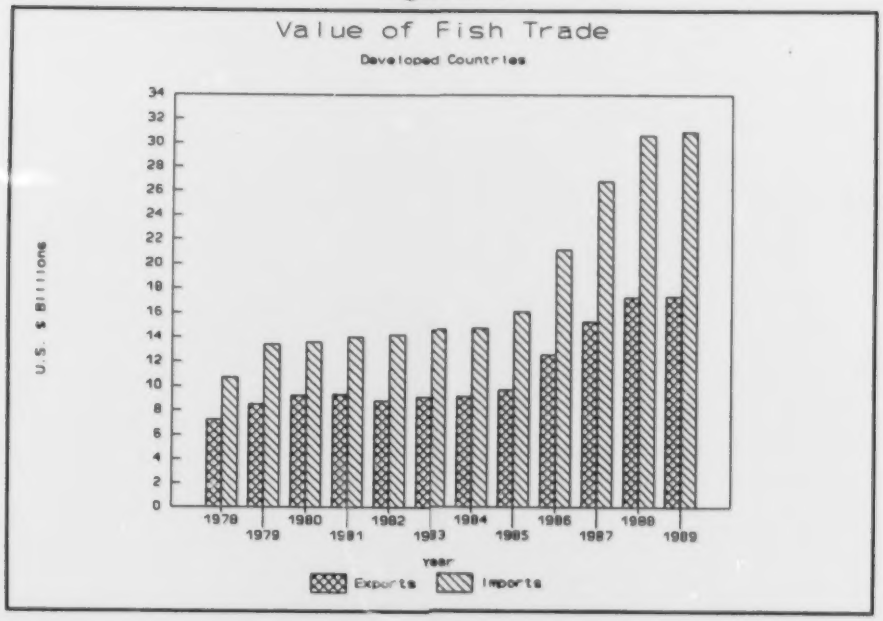
Table III 5 Fish as a Percent of the Value of Total Merchandise Trade, Developed and Developing Countries

	Developed Countries		Developing Countries	
	Exports	Imports	Exports	Imports
	(% of value of total merchandise trade)			
1984	0.64	0.97	1.44	0.50
1985	0.66	1.01	1.61	0.54
1986	0.75	1.20	2.31	0.67
1987	0.78	1.30	2.39	0.71
1988	0.77	1.31	2.40	0.75
1989	0.73	1.24	2.18	0.70

Sources: FAO Fishery Statistics Yearbook, Vol. 69 and FAO Trade Yearbook, Vol. 43.

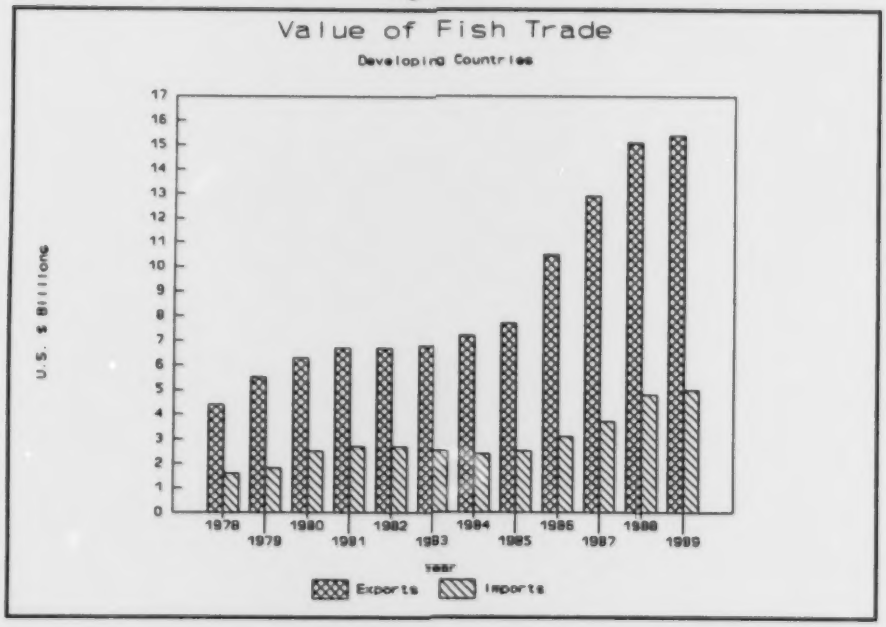
The rapid growth in fish exports relative to imports means that fish is making an increased net positive contribution to the balance of payments in the developing countries. However, this contribution must be weighted against the cost of the imported inputs required to produce fish for export and not counted here as "imports of fish". In much of the Third World the export market is supplied by the industrial fisheries sector. These fisheries use technologically advanced vessels and equipment which tend to be imported. In addition, one of the major inputs of industrial fisheries is fuel, which for many developing countries also has to be imported. These costs could significantly diminish the foreign exchange earnings of fisheries in the Third World. Further, intensive aquaculture in Third World Countries relies on imported inputs e.g. fishmeal, in the Philippines, where, some commentators say, fish ponds consume, not produce, fish.

Figure III 1



Source: FAO Fisheries Statistics Yearbook

Figure III 2



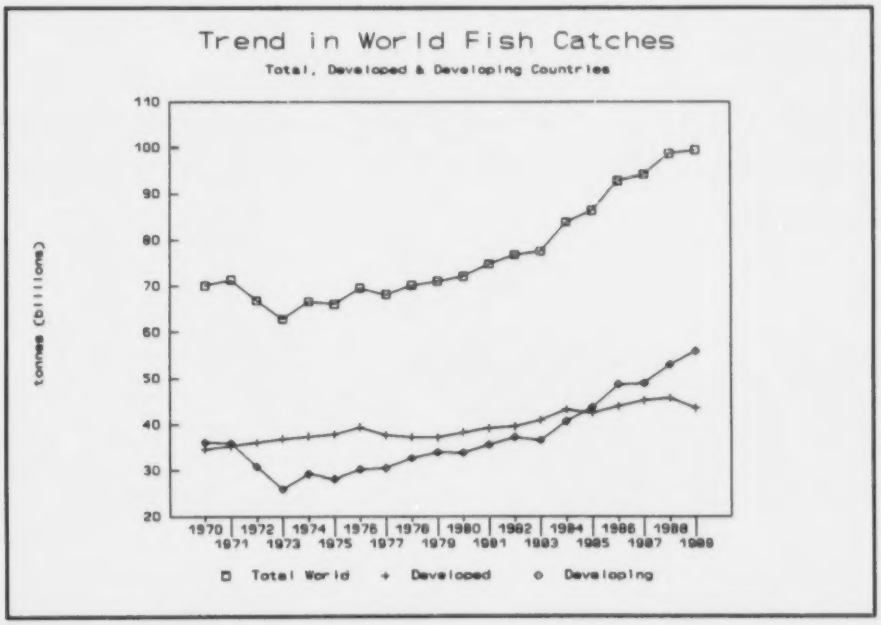
Source: FAO Fisheries Statistics Yearbook

An even more important cost to weigh against the foreign exchange earnings of the fisheries sectors of developing countries is the effect of fish exports on local food supplies. Only because the fish catches of developing countries increased very rapidly in the past 10 years (see Figure III 3), and because traded species tend to be those with a high commercial value (eg. tuna and crustaceans), were higher exports values achieved without a reduction in the average per capita supply of fish for food in the developing countries (Table III 1). However, for many of the poorest countries, food shortages are a continuing problem. Without the increased exports, fish could be playing a more important role in domestic food supplies.

Increasing foreign exchange earnings through fish exports can have other negative effects. Fisheries development aimed at the production of high-value species for export often means the development of a new industrial fishery, which can interfere with the traditional fishing areas of the artisanal fishers. Many developing countries have attempted to reduce these user conflicts by designating the inshore waters for the exclusive use of artisanal fishers. However, these designations are often ignored by the industrial fleets, and without adequate monitoring and enforcement programs, governments are often powerless to stop them.

Even if a project is designed to increase the production of the export species by the artisanal sector, because of the consequent reallocation of productive resources, domestic supplies of fish can be reduced and available only at higher prices [Kent,p. 41]. The impacts may be particularly severe for women as such projects tend to divert fish from the artisanal processing sectors which are often dominated by women [Nauen, 1989, p. 15].

Figure III 3



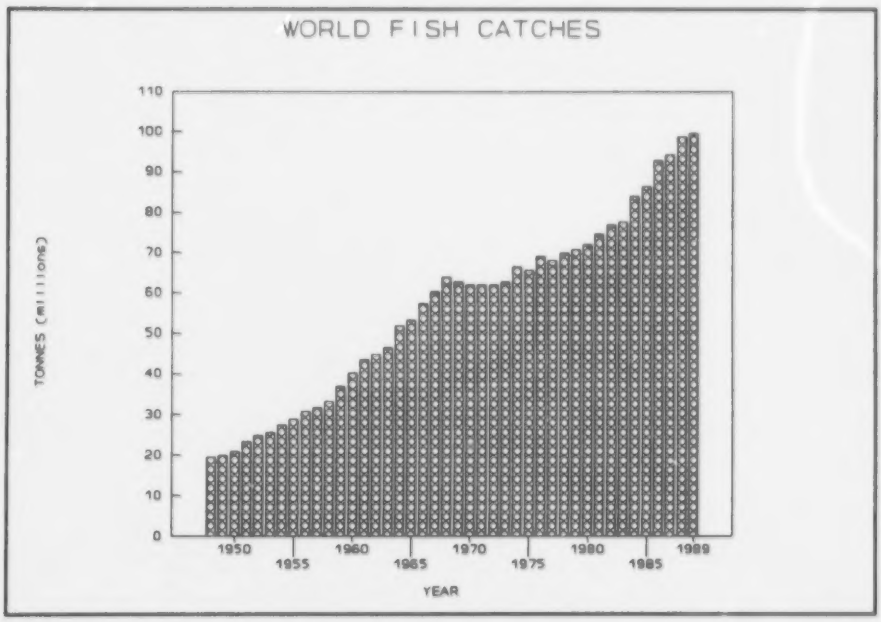
Source: FAO Fisheries Statistics Yearbook

4 TRENDS IN WORLD FISHERIES

The post-war period was one of unprecedented growth in the world's fisheries. Between 1950 and 1970 the world's catch increased from about 20 to 65 million tonnes (Figure II 4). Much of this growth resulted from the development of more effective fish harvesting technology such as on-board freezing capability, mechanical gear-hauling, and the use of synthetic fibre for nets [Robinson, 1984, p. 3]. Harvests in the artisanal fisheries also grew as the population of coastal villages in developing countries increased [Thomson, 1980, p. 3].

By the mid 1970s the world fish catches appeared to be levelling off at around 70 million tonnes per annum. Around the same time the anchovy stocks off the west coast of South America collapsed and the harvests of major species such as Atlantic Herring, South African Pilchard and Atlantic Cod dropped [Robinson, 1984, p. 7]. The limits of the oceans' resources appeared to be approaching. This concern prompted a review of how the world's oceans were being managed that eventually resulted an extension of the jurisdiction of coastal countries to a 200-nautical-mile limit. This new "Law of the Sea" was adopted by over 100 countries in 1982 and as a result over 90 percent of the oceans' resources now fall under national control and management.

Figure III 4



Source: FAO Fisheries Statistics Yearbook

The new international management regime presented great opportunities for coastal countries to increase the benefits they derived from the oceans. But it also meant greater fisheries management costs if these new benefits were to be realized. Establishing an appropriate and fair management program requires biological, social and economic research, consultation with the user groups and communities that will be affected, and the

establishment of legal, administrative and enforcement frameworks. After a management program is established, there are the ongoing costs of biological stock assessments, monitoring of fish harvests and fishing effort, and enforcement of the fishing regulations (which are particularly high for small island nations or countries with long coastlines). Developing countries have the greatest difficulty in establishing and maintaining good management regimes, not only because of the monetary costs involved, but also because of the shortage of skilled biologists, economists and administrators in many of these countries [FAO, 1984, p. 15].

Since the mid 1980s, the world fish catches have once again been increasing at a rapid rate (Figure III 4). This is largely the result of increasing diversification in the world's industrial fisheries. To increase their harvests, industrial fleets began to fish in previously unexploited waters and using even more effective fishing technology [McGoodwin, 1990, p.2]. This has meant that any increases in harvests by the industrial fisheries has come about only through increases in average cost per unit of catch.

Events of the last ten years have also led to an increase in the fishing costs in artisanal fisheries. The sections above demonstrate the importance of these fisheries as a source of employment and food in much of the Third World. Yet for years it was assumed that as development progressed, artisanal fisheries would gradually be replaced by modern, efficient and capital intensive fisheries. It was only in the early 1980s that it began to be recognized that artisanal fisheries are in most cases, a more appropriate mode of production for poor countries. It has been estimated that they provide almost 20 times as many jobs as industrial fisheries and at approximately one percent of the capital cost [Thomson, 1980, p. 3].

This recognition meant that developing country governments and international and national foreign aid agencies began to direct more funds to the development of artisanal fisheries. Many of these projects aimed to increase production by providing more modern equipment, most commonly motors, to artisanal fishers. The result was an increase in harvest, but again at a higher per unit cost. This development, coupled with increasing demands for fish due to population growth, and the development of industrial fisheries in the Third World, has resulted in fish harvests that have grown at an even faster pace than the fish harvests of the developed countries (Figure III 3).

Despite the recent increase in the world's fish catches, it is clear that they cannot increase indefinitely. This has raised concerns that the world's fish supply will not be able to meet the demand of an ever-increasing world population. This is of particular concern to the Third World as the price of fish is likely to increase as demand increases relative to supply and fishing costs continue to rise. These gloomy prospects suggest an number of important issues for the future:

1. Fisheries management must continue to improve. More resources need to be directed into research and enforcement to ensure current harvest levels are sustained.

2. Currently, over 30 percent of the world's fish harvest is used for non-food purposes, up from about 26 percent ten years ago [FAO Fisheries Statistics Yearbook, Vol.57 and Vol. 69]. As food becomes increasingly scarce in the future, this trend must be reversed.

3. It has been estimated that industrial shrimp trawlers destroy anywhere from 6 to 16 million tonnes of fish as by-catch each year [Lindquist, 1988]. This practise is encouraged by the

relative values of shrimp and the by-catch species. Regulations to change it are unlikely to be successful because of prohibitive enforcement costs.

4. Post-harvest losses continue to be a problem in the Third World. Factors contributing to this include the tropical climates of many developing countries, the continued use of traditional but inefficient processing techniques, the lack of refrigeration, and the inadequacies of transportation systems.

5. Artisanal fisheries development projects will have to shift their focus from helping fishers increase the ability to increase harvests in fisheries that are already over-capitalized, to helping the developing countries improve their management capabilities, reduce post-harvest losses, improve the utilization of the catch, and increase their aquaculture production.

IV STRUCTURAL ADJUSTMENT AND THE FISHERIES SECTOR

This section examines the objectives and content of structural adjustment programs, and the rationale for their adoption. It also looks briefly at some of the criticisms which have been levelled against them, and what this might mean for the design of alternative programs. It then reviews the performance of countries which have adopted them.

The latter half of the section explores the different ways in which structural adjustment programs might be expected to affect the fisheries sector of third world countries and the people and communities involved in that sector.

1. OBJECTIVES OF STRUCTURAL ADJUSTMENT

Structural adjustment is now the policy orthodoxy in most third world countries, but it is the subject of much debate. Its proponents would argue that its objectives are to restore economic growth in a context of both external and internal balance. Indeed, they would go further and hold that balance externally and internally are a requirement for growth to be sustained over any length of time, and that growth itself is necessary if income distribution is to be made more equitable and if poverty is to be addressed. By internal balance is meant the reduction of inflation, the eradication of fiscal deficits, and the closing of gaps between savings and investment.

Critics of structural adjustment, on the other hand, would argue that the main objective is to integrate the economies of the third world more closely into the world economy, and more specifically, into those of the industrialised capitalist world. They maintain that this will limit the economic options facing third world countries and perpetuate, at best, a form of dependent development in which the fruits of limited and uncertain growth will be shared very unevenly.

These competing views are at one level simply a continuation of a long-standing debate about the nature, potential and beneficiaries of the development process historically (including, of course, the purpose and efficacy of foreign aid in that process). But disputes about the nature of structural adjustment are also compounded by the difficulty of conducting empirical evaluation in this area free of ideological or even 'scientific' bias. This debate will be an on-going one, not easily resolved, but a closer look at the policies and instruments will help explain the competing points of view.

2. THE MAIN POLICY DIRECTIONS AND INSTRUMENTS OF STRUCTURAL ADJUSTMENT

The main pressure for structural adjustment in the third world is the economic, social and political crisis brought on, ostensibly, by an acute shortage of foreign exchange. The chronic dependence of most third world countries on imported goods, a reflection of colonial economic policies emphasising domestic production for export, and post-colonial policies emphasising import-substitution industrialisation with little local value-added, renders them particularly susceptible to foreign exchange scarcity. The precise cause of this scarcity is, again, often the subject of debate. Some argue that domestic policy weaknesses are responsible, namely excessive state expenditures and excessive state intervention in the economy, leading to inflation, over-valued exchange rates and resulting perverse incentives for imports, exports and capital flows. Others argue that it is the outcome of adverse global trends and an inadequate system globally to deal with these trends, grafted onto an economic structure that is too externally oriented in the first place.

Whatever the underlying causes, the fact is that, once in crisis, access to additional foreign exchange, in the form of loans, debt-rescheduling or forgiveness, increased foreign private investment or further foreign aid, is now almost always subject to the recipient government adopting an orthodox structural adjustment program. This is because the International Monetary Fund (IMF) and the World Bank (IBRD) are the only significant source of new loans for most third world countries and they will lend only if economic policy is shaped to their liking in the form of an approved structural adjustment program. Furthermore, other possible sources of external finance, such as banks, aid agencies and export credit agencies, are increasingly tying their assistance, in the form of new flows or reduced or delayed debt servicing, to the prior adoption of an IMF/IBRD structural adjustment program. This policy conditionality is seen as a sensible precaution by creditors/donors to ensure sound use of their funds. By critics it

is seen as a new form of dependency, an encroachment on national sovereignty, a form of 'heteronomy' or political domination, since the ostensible freedom not to accept the funds, and therefore, the conditionality, is imaginary given the lack of options for escaping the foreign exchange crisis.

2.1 Policies and Internal Impacts

The nature of orthodox adjustment policies is not static, but rather has changed over time in the light of experience and, it must be stressed, in response to some of the earlier critiques. In the late 1970s and early 1980s, the emphasis was on a combination of stabilisation or demand restraint and on 'getting prices right'. By the mid 1980s it was clear that a longer time horizon had to be built into these programs and that this required, among other things, more money on easier terms, and longer repayment periods. It also meant not just moving from one to three year or longer periods for policy formulation and implementation, but also a qualitative shift in policy emphasis. In recent years the international institutions have emphasised the need for institutional reforms, for human resource development, for more thoroughly detailed sectoral programs and policies, for assessing and dealing with some of the social impacts of adjustment and poverty and, most recently, have issued strong statements on the need for democracy and for reducing third world expenditures on arms.

Demand restraint is a major and on-going feature of adjustment programs; it figures most prominently in the early days of adjustment when the need to address large imbalances is most pressing. It takes the form of a general tightening of access to credit by both the public and private sectors, and a raising of real interest rates to reflect and reinforce the resulting monetary contraction. This is designed to squeeze effective demand, thereby easing pressure on import demand and on domestic resources. Reducing the credit requirements of government usually entails cutting back real government spending, by diminishing the quality or quantity of services, by laying off staff, and by reducing subsidies to consumers, producers, transporters, and state-owned enterprises. Raising taxes and introducing user fees for state services are also common demand restraint features of adjustment programs. Wage restraint, in effect leading to sharp falls in real wages if inflation is high, is also usually part of the policy package. Finally, if devaluation is a feature of policy reform, this too can effectively reduce demand in the economy when expenditures on imports are greatly in excess of receipts from exports, since the rise in price of foreign currency will result in more local currency being withdrawn from circulation to finance the foreign exchange gap.

The main impact of devaluation, however, is on 'getting prices right' and it is only one, albeit a major one, of several policy instruments designed to accomplish this. Along with the abolition or gradual erosion of the administrative setting of prices and interest rates, changes in the exchange rate are designed to abolish black markets and the rents which accrue to bureaucrats, black marketeers and others fortunate enough to be able to access resources under conditions of scarcity. By introducing a price for foreign currency which more accurately reflects its scarcity, it is argued, a more efficient allocation of resources and division of labour is achieved, which ought to encourage those exporting goods, and make it less attractive for those using foreign exchange to import goods. The gradual abolition of import controls and licensing and the rationalisation of protective import tariffs is designed to reinforce exchange rate realignment.

Liberalisation of prices goes well beyond the exchange rate to encompass, as we have seen above, interest rate reform and the reduction or abolition of subsidies and domestic price controls. The idea again is to allow market forces a bigger role in setting prices and, hence, in resource allocation. The most common form of subsidies are those on food which, according to the orthodoxy, result either in lower than optimal prices for the growing of food or, where the subsidy does not affect producer prices, in final consumer product prices which are lower than those which would be set by the market. Resource allocation or efficiency considerations, as well as the need to restrain aggregate demand, lie behind subsidy removal. Similar justifications are used for reducing state intervention in the formation of domestic prices generally, through price control and state monopolies over production or distribution of goods.

Institutional reform has always been a feature of adjustment packages, but this aspect has been given greater emphasis in recent years. Privatisation and reduced state ownership generally, have long characterised adjustment policy, but the international financial institutions (IFIs) have experienced difficulty in persuading governments to reduce state ownership as quickly as they would like. Of growing concern for the IFIs is the slowness of private

foreign investment and of domestic savings to respond to reform, especially in Sub-Saharan Africa. Recent reform packages have, therefore, contained measures to try to address these difficulties more directly. The institutional basis of stubbornly high rates of inflation is also occupying the attention of the IFIs. Public sector management, human resource development, tax policy and administration, financial sector reform and fairly detailed programs for reform of key sectors of the economy, are now much more prominent than they used to be. These are all, transparently, policy initiatives which can only be implemented successfully over the long haul, which is why it can be argued that structural adjustment policy has now become synonymous with 'development' policy.

2.2 Critiques

A common critique of structural adjustment programs throughout much of the 1970s was that they caused great hardship for certain sectors of the community, that they worsened income distribution, and that they were insensitive to the suffering they caused to the poor and others. These critiques were never accepted by the IFIs, and the IMF maintains to this day that the distributional impact of programs lies entirely within the policy domain of the government receiving IMF credits. This is disingenuous as the Fund pronounces directly on wages, salaries, taxes, producer and consumer prices. It has, however, offered in recent years to assist governments in assessing distributional impacts. The World Bank has gone much further. In a number of countries it has set up living standard surveys which will, over time, allow for a reasonably clear analysis of the social impact of policy reform. The IBRD has also built on to the end of its programs provisions for 'mitigating' some of the social impacts of adjustment. These take a variety of forms, but include employment creation projects or public works expenditures for those laid off, redundancy payments, retraining incentives, and grants for ex-employees to set up small businesses. Special measures are taken to bolster access to preventive health care (in the form, for instance, of funds for purchasing essential drugs or subsidies for the poor), and to provide supplies to educational and social welfare. Some programs provide food for work, targeted food subsidies, or nutritional programs aimed at the poor.

There are clear limits, however, to what can be accomplished in these efforts to 'mitigate' the impact of adjustment or to alleviate poverty, be it induced by adjustment or not. The very objective of adjustment is radical redistribution of incomes through the radical reorientation of the direction of economic policy.

In recent years the IFIs have begun stressing the need for recipients of assistance to introduce democratic, multi-party political structures and to reduce expenditures on the military. There is no doubt that pressures from donors contributed to political reform in Zambia, and the eventual ousting through the ballot box of UNIP which had ruled since independence. The main pressure came, however, from ordinary Zambians, tired of economic crisis and the government's attempts to deal with it by abolishing food subsidies. What remains to be seen, therefore, is whether a democratically elected Zambian government can survive the implementation of the kind of drastic austerity being demanded by the IFIs.

Before turning to look at how structural adjustment policies might affect the fisheries sector, it might be worth while reviewing, very briefly, some of the main criticisms of the orthodoxy and the kind of alternative approach to which they might give rise.

The main criticisms are that adjustment programs erode national sovereignty and push third world economies in a particular ideological direction, which is both market oriented and private enterprise oriented. The result is to undermine efforts at national self-reliance and, ironically, even at building a national private industrial sector, since the orthodoxy presses for, and rewards, greater international integration. Critics argue that adjustment measures are very blunt and give across-the-board price incentives to export promotion, without due regard for non-price constraints on non-traditional exports such as manufactures. On the other hand, primary exports do tend to respond well to price incentives, so much so that for some beverage commodities (coffee, cocoa and tea) and cotton, global overproduction has resulted with consequent sharp falls in world export prices. Primary export growth has also been associated with environmental damage as forests are cleared and mining operations expanded.

Often, adjustment programs fail to deal explicitly with food production, the assumption being that if prices are right, the output will be there or the foreign exchange will be there to permit the purchase of food imports. Little regard is paid to the possible impact of export promotion on domestic food supplies, or on the many non-price constraints, beyond transport, impeding an expansion of food production. Gender issues are important here as reorientation of

production entails reorientation of family labour, often, it is claimed, at the expense of women. Critics also argue that the emphasis on export promotion is based on short-run or static notions of efficiency and comparative advantage, and is designed to re-integrate the third world into the global capitalist economy on traditional lines, with them acting mainly as hewers of wood or drawers of water. This serves at the same time, of course, to underscore the legitimacy of past debt obligations and to bind debtors even further with debt through structural adjustment loans.

2.3 Alternative Programs

Alternative adjustment programs would put explicit emphasis on food security, would be more selective in promoting exports, more sensitive to constraints on labour supply, especially to the burdens on women, and more mindful of possible environmental implications. They would avoid large cuts in income or employment, and would be more circumspect in reducing state involvement in the economy and in relying on uncontrolled market forces. The major problem with this type of approach is that it will not receive support from the IFIs or official donors, and hence has only been attempted in conditions of acute foreign exchange scarcity and, accordingly, with poor results.

2.4 The Record

At the same time, the record of orthodox programs is at best chequered. In the 1970s, middle income third world countries which were export or oil producers, tended to do well after adjustment programs were introduced. For poorer countries, the record of those with programs was not better than that of those without, and in some areas was much worse.

The experience of the 1980s does not remove the ambiguity. In only a half of the countries with IMF/IBRD adjustment programs did growth improve relative to countries without such programs. For nearly two thirds of adjusting countries, the ratio of investment to GDP actually deteriorated, while for only a half of all such countries did inflation and external debt burdens (debt/exports, debt servicing/exports) improve [IBRD, 1988, p.24]. Again, improvements were greatest among exporters of manufactures, which showed improvements in seven of nine areas, excepting inflation and investment. Differences were much less pronounced in poorer countries, and in highly indebted poor countries the record of those without IMF/IBRD programs was actually slightly better than those with.

What remains unclear is what the record of those with programs would have been without a program. Furthermore, the IMF/IBRD would argue that the poor performance of some countries with programs was due to inadequate implementation by governments. It is apparent, though, that the difficulties involved in assessing performance, and especially the counterfactual and the likely long-term effects of different approaches, renders it impossible to settle the debate definitively by reference to empirical research. For our purposes, however, it is sufficient to note the existence of the criticisms in examining the adjustment record of the three countries under review since each of them has been implementing orthodox, IMF/IBRD programs, in the period in question.

3 THE LIKELY IMPACT OF ADJUSTMENT PROGRAMS ON THE FISHERIES SECTOR

A major gap in the literature, albeit one which is gradually being addressed, is the impact of structural adjustment programs at the microeconomic or sectoral level. The fisheries sector is particularly neglected, in spite of its relative importance in some countries, regions and localities in which adjustment programs are being implemented. Yet, ultimately, the adjustment process can only be properly understood, with all its complex ramifications, by reference to its workings at these levels. Conceptually, one can of course sketch out how it might possibly work in any given sector, and this is the purpose of this section. How closely reality conforms to this sketch is a matter for empirical research, although one should not underestimate the problems involved in collecting the data needed to test theoretical hypotheses, especially in the artisanal fisheries sector.

On the demand side, one can hypothesise that adjustment programs are likely to affect both the absolute amount of demand and its composition. To begin with, the austerity inherent in the earlier stabilisation phase is likely to depress local commercial demand for fish, as urban incomes in particular are squeezed, and especially so if it entails removing subsidies on consumer prices. On the other hand, direct consumption of fish by those working in the

industry may rise, fall or remain unchanged in response to falling commercial sales, depending on how producers react. They could keep production unchanged and either consume the increased surplus or try to offload even more than previously at lower prices in an effort to recoup lost cash income. Alternatively, they could reduce output in line with demand. Theory tells us little about the inter-relationship between own and commercial demand, but on the purely commercial side, with less than completely elastic or inelastic supply, there will be both price and production falls. Direct consumption of fish can be expected to rise also if more people enter the fishing sector in response to declining opportunities elsewhere.

After the stabilisation phase has passed, and if the reforms are successful in restoring growth, then one can expect local commercial demand for fish to rise.
There will be substitution effects of adjustment programs too. Local commercial and direct demand for fish will be affected by changes in the relative prices of other forms of protein. The demand for the production of fish for export can be expected to increase in response to devaluation and/or other export incentives, the degree to which it does so depending on the elasticity of demand for different types of fish and the importance of non-price barriers to trade.

The ability to meet increases in demand depends first and foremost on the resource base, and it will be critical to ascertain the impact of macro policy changes on the ability of fish stocks to reproduce themselves. Thereafter, the supply response will be a function of the extent to which surplus capacity can be brought into use, including that in labour effort, and the rate at which new capacity can be added. It will also depend, importantly, on the degree to which exports are met from fish previously consumed locally. If the species exported are not usually consumed by the local population, on account of price or taste, increased exports must come from greater effort or expanded capacity. It would also be expected that new varieties of fish or fish products might be exported in response to price and other incentives, as 'non-traditional' exports. Where products previously consumed locally are diverted to the export market, new, cheaper, varieties of fish may enter into the local diet including, possibly, cheaper varieties imported from abroad.

Supply will be affected by changes in the prices of inputs occasioned by adjustment policies. Devaluation will tend to raise the official price of imports but the practical effect of this will depend upon the extent to which the fishers were already buying on the black market, and on whether foreign suppliers respond by lowering foreign currency prices (as the Japanese did in response to devaluation of the US dollar). Tariff and tax reform may also help offset devaluation-induced cost increases. Real wages can be expected to fall in the earlier stages of adjustment, the importance of this depending, of course, on the extent to which wage employment characterises the industry. The local costs of inputs other than labour will also generally rise in line with the inflation rate, but at a lower rate than import costs unless the black market and tariff reductions are significant. Where substitution is important, local prices of fish will tend to keep pace with what can be earned in the export market. Interest costs of credit in the formal sector, where available, will also tend to rise.

Where changes in the relative prices of inputs are significant, one would expect producers to respond by changing technology, the relative use of capital and labour, and possibly the balance between local and imported goods. Of particular importance would be any changes in total employment, in all segments of the industry from catching to processing to marketing of the fish, as well as in the production of inputs. There may well also be significant shifts in the gender composition of the labour force, in response to changes in supply and/or in industrial structure.

The ability of the fisheries sector to respond to increased demand may depend upon the accessibility of credit, in terms of availability and cost, for the expansion of fixed or working capital. Credit restraint might frustrate the attempt to expand production. Likewise, expansion may require access to foreign exchange. This might be influenced by the abolition of import licensing, the introduction of retention schemes or the increased availability of foreign aid or credit consequent upon the adoption of adjustment programs. In this connection, it will be instructive to ascertain what has happened to investment in this sector since, as we have seen (section 2.4), there appears to be a tendency for the overall rate of investment to fall under structural adjustment.

Adjustment programs are likely to alter the returns to different kinds of fishery, depending on their cost and market structure. This may, in turn, lead to changes in industrial structure, in the relative importance of different types of fisheries and especially in favour of those catering to the external market. It may favour foreign over local ownership as the value of local assets is reduced in foreign exchange terms and as the availability of foreign capital

shifts the balance of corporate purchasing power. There may be reductions in the influence of state enterprises and of state regulation. The relative influence of producers versus processors versus merchants may also change, and this may have significance in terms of gender too.

Restraint on government spending may adversely affect the ability of the state to regulate the fisheries sector, to provide advice, extension services, subsidies, resource management training and credit. Such difficulties may or may not be countered by the introduction of sectoral credits from aid agencies.

On the social side, structural adjustment programs might, in theory, adversely affect the diets of the local population by making fish less affordable. The overall impact on fisheries communities will be a combination of positive influences in terms of greater export opportunities, and negative influences in terms of greater competition from industrial or foreign fleets for the limited resource, more people moving into artisanal fishing, and restraint on health, education and other services provided by the state.

Finally, one can expect greater pressure on the resource base from adjustment programs. Greater demand for fish, more people and firms fishing and a reduced ability to police the fisheries can be expected to lead to (further) over-fishing. Enhanced export incentives may also put more pressure on sensitive coastal environments, through competing resource use, pollution and greater coastal traffic. Questions of property rights may arise and their resolution may have critical importance for those inhabiting or drawing their living from the coastline.

Clearly, it will be difficult to shed light on these many complex issues in an exercise built on reviewing available information from secondary sources. On-the-spot observation over a period of time would be essential to provide definitive answers. Even then, evaluating the impact of economic reform is never an easy matter, given the difficulty of assigning causation in a situation in which more than merely macro policy is changing, and of ascertaining the counterfactual ie what would have happened in the absence of an adjustment program. Nonetheless, this framework will be useful in surveying what is known, what is ambiguous, and what must be the object of further research and, inevitably, this will vary greatly from country to country, given the enormous variation in the quantity and quality of published information.

V CASE STUDY: SENEGAL

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V CASE STUDY: SENEGAL

Senegal is located on the extreme west coast of Africa and has a land mass of 196,000 square kms. Of the estimated 7.7 million people, 80 percent live along its 700 kms of coastline. As a member of the West Africa Monetary Union, it shares the common currency CFA franc (FCFA) which is guaranteed by the French.

On independence in 1960, Senegal was relatively advanced compared to other West African States, with good infrastructure, a diversified industrial sector and a pool of educated personnel. It was, however, overwhelmingly dependent on one commodity, groundnuts, for its export earnings.

Since Independence the government has been successful in diversifying the economy and its export base, so that fish, phosphates, petroleum products (based on imported crude oil) and cotton now contribute significantly to export earnings, accounting for over 45 percent of the total.

The principal domestic food item is millet, but the country is quite dependent upon imports of higher income foods such as rice, wheat, etc. which accounted for almost one third of imports in 1985. Senegal relies heavily on imports for capital goods, intermediate industrial inputs and, of course, petroleum. The availability of foreign exchange and the weather are the two dominant influences on the performance of the economy.

1 THE ECONOMY IN THE 1970s

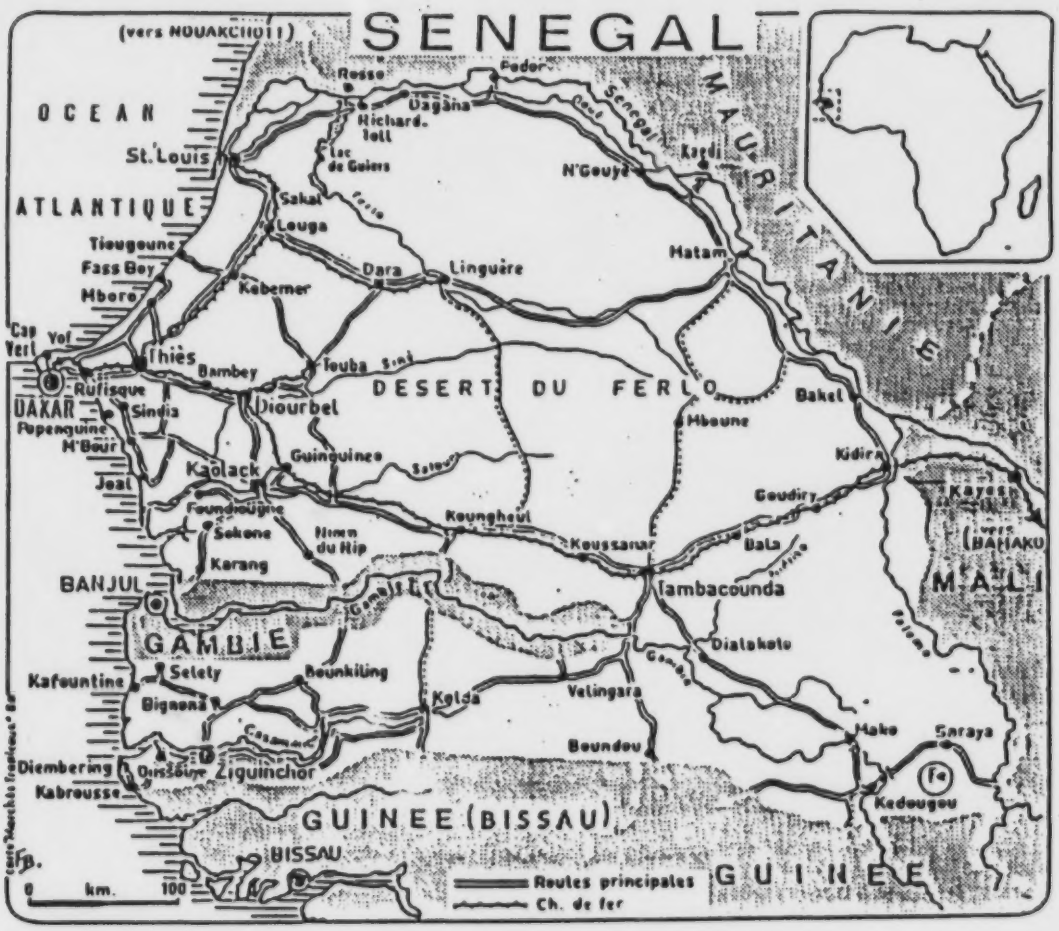
In the early 1970s an export boom in groundnuts and phosphates let to a rapid increase in growth of incomes per capita. With the exception of 1973, when the economy was buffeted both by bad weather and the increase in the price of oil, the economy expanded strongly to 1976.

Indeed, it is clear that it overexpanded, as domestic credit and money supply were allowed to rise rapidly as a percentage of GDP and as inflation rose from 3.9 percent per annum in 1971 to almost 32 percent per annum in 1975. This was fuelled in part, by an almost 40 percent increase in real wages in that year as workers sought to reverse several years of erosion in their living standards.

With a fixed exchange rate, the rapid increase in domestic inflation, at a rate far higher than that of industrial country trading partners, led to the appreciation of the real exchange rate and, accordingly, a decline in Senegal's competitiveness. This, combined with drought and a fall in the world price of groundnuts of 37 percent, resulted in an enormous drop in export earnings, from $667 million in 1977 to $402 million in 1978, or by 40 percent. Imports, however, continued to rise so that the negative trade balance which had been reduced to just over $100 million by 1977, reached $460 million by 1981. The gap was financed by borrowing from both the private and public sectors abroad, and by increased flows of foreign aid. Foreign debt rose from somewhere in the region of $150 million in 1970 to $1.5 billion by 1980. Foreign aid was in the region of $300 million per annum by the end of the 1970s and domestic savings were negative.

It was in the context of this external and domestic disequilibria that Senegal looked to the IMF and the World Bank for assistance.

Figure V 1


SENEGAL
(vers NOUAKCHOTT)
OCEAN
ATLANTIQUE
St.Louis
Rosso
Podor
Richard-Toll
Lac de Guiers
N'Gouye
Kaedi
MAURITANIE
Sakal
Louga
Tiougoune
Fass Boy
Mbore
Kebemer
Dara
Linguère
Matam
Cap Vert
Yof
Thiès
Bambey
Touba
DESERT DU FERLO
DAKAR
Rufisque
Sindia
Diourbel
Bakel
Mboune
Popenguine
N'Bour
Kaolack
Guinguineo
Kidira
Joal
Foundiougne
Koungheul
Goudiry
Kayes
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Koussanar
Bala
(BAMAKU)
Kerang
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Tambacounda
MALI
GAMBIE
Dialakoto
Kafountine
Selety
Bounkiling
Velingara
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Sanaya
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Boundou
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Kabrousse
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Ch. de fer
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2 STRUCTURAL ADJUSTMENT PROGRAMS AND THEIR IMPACT

In 1980 Senegal entered into a three year Extended Fund Facility (EFF) with the IMF for SDR 184.8 million and also obtained a Structural Adjustment Loan (SAL) from the World Bank. (This was a joint IDA credit for SRD $22.9 million and World Bank loan for $30 million.) The aim of SAL I was to increase public savings, raise the productivity of investments and the efficiency of the parastatal sector, improve incentives for production and export, constrain urban consumption and reform agricultural institutions and policy.

The macroeconomic aims of the EFF and the SAL I were to achieve a 4 percent p.a. growth, to reduce the current account deficit from 15.6 percent GDP to 6.7 percent by 1985, to raise net public savings from 15 percent of public investment to 25 percent, and to raise the rate of investment from 16 to 18 percent of GDP.

While some progress was made in terms of raising incentives and efficiency and reducing price distortions, both the EFF and the SAL agreements were cancelled because the macro economic targets were not met and because the pace of reform in agriculture was considered deficient. The main causes of the macro failure were disastrous weather and groundnut/food harvests in 1980-81 and completely over-optimistic forecasts of world prices, especially those for groundnuts. Since the government had raised local groundnut prices considerably in line with these forecasts, when world prices fell the budget went into massive deficit. The consensus is that SAL 1 tried to do too much in too short a time. Furthermore, no provision was made for contingencies. In any event, Senegal could still, at that time, obtain some concessional funds without conditionality so the commitment to the program was, at best, lukewarm.

Under pressure from creditors, especially France, however, Senegal reopened negotiations with the IMF and successfully completed a standby arrangement in 1981/82 and negotiated another in 1982/83. This latter collapsed under political pressure as the 1983 elections were nearing. Relations with the Fund were restored after the elections and Senegal has had a series of arrangements with the IMF since then. The macro economy went from boom to bust between 1982 and 1984 as exports rose sharply and then dropped. Inflation began to rise, GDP fell and the fiscal deficit deteriorated to over 8 percent of GDP. At this point a new agreement for a SAL was reached with the IBRD for $70 million, followed in 1987 by SAL III (SDR 40 million) and in 1990 by SAL IV ($84.4 million).

Senegal can be said, therefore, to have been implementing stabilization programs since 1983 but these were dwarfed by fluctuations induced by the weather and world markets. Structural adjustment proper did not begin until 1985 when the government launched its PAML (Medium to Long Term Adjustment Plan).

The objectives of SAL II were to raise GDP growth to 3.4 percent per annum between 1986-90, to achieve export growth of 5.1 percent per annum, to raise the ratio of domestic savings to GDP from 1 percent to 10.7 percent, and the investment ratio from 13 to 17.3 percent GDP. The debt service ratio was to be reduced to 20 percent by 1990 from an estimated 31 percent in 1987 and the share of external debt in GDP to 66 percent (it was 106 percent in 1985).

SAL II contained 46 wide-ranging conditions but focused mainly on accelerating growth and improving public sector management. Unusual in structural adjustment agreements at that time, rather than stressing agricultural reform generally [see IBRD 1988, esp p. 49 and 50], explicit emphasis was put on improving food self

sufficiency. This was to be achieved by greater incentives to produce cereals, increasing the prices of imported food, liberalising food marketing and improving production potential.

Returns to groundnut producers were also to be increased, the marketing of inputs and output was to be liberalized, and government financial support reduced. In the industrial sector, price controls were to be eliminated and tariffs and subsidies reduced and rationalized. In the state sector the budget process was to be reformed, state enterprises rationalized or privatised and steps taken to reduce spending and to raise revenue.

SAP II was considered to be successful, although it is generally acknowledged that the external environment - especially favourable weather conditions but also reduced oil import prices - was very propitious, making it difficult to assess the precise contribution of the program to improved economic performance. Nonetheless, growth targets were exceeded over the three year period, the rate of inflation was cut back to 4.3 percent per annum, the fiscal deficit was reduced from over 8 percent to 2.6 percent GDP, largely by cutting back government spending, and the current account balance of payments was also reduced significantly as a percentage of GDP.

SAP III was designed to consolidate these achievements and had the objectives of bringing inflation down to 3.4 percent per annum by 1990, maintaining a growth rate of GDP of 3.9 percent per annum, and reducing the external current account deficit to 7.3 percent of GDP. It contained a mammoth 77 provisions touching most aspects of government policy. The principal ones were promotion of the private sector, reduction of the role of the state in direct production activities, and measures to enhance efficiency through price and other incentives.

Accomplishments under SAL III were mixed. Growth was strong in 1988 but bad weather resulted in a fall in GDP in 1989. The rate of inflation has fallen almost to zero and the current account imbalance in dollar terms was about $100 million per annum less in 1989 than at the beginning of the adjustment programs.

SAL IV was introduced in 1990 and is putting greater emphasis on export promotion and labour market reform.

What about the social impact of adjustment? Pre-adjustment progress in several areas appears to have been maintained. Infant mortality rates have improved steadily from 167 per 1,000 live births in 1968 to 120 in 1975 and 87 in 1990. Nevertheless, infant-juvenile (before age five) mortality rates remain exceptionally high at 189 per 1,000 [UNDP, 1991]. The death rate has improved since 1981 from 18.5 to 14 per 1,000 in 1990. During this same time period the birth rate has dropped from 46.1 per 1,000 to 44 and the literacy rate has almost tripled from 12 percent of the population to 32 percent in 1986 [Ibid].

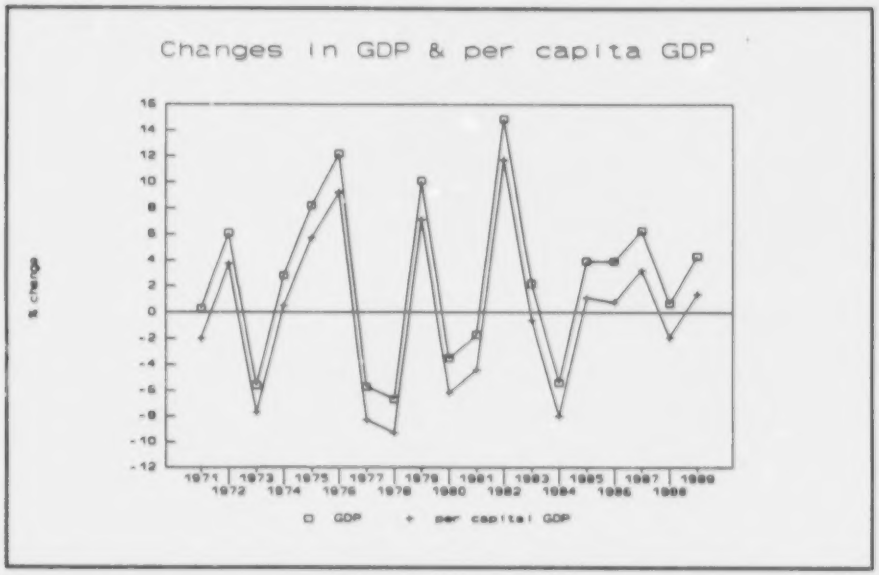
How then, did the extreme austerity of the program in Senegal show itself? Where were the effects of the cutbacks felt the most? Berg [1990] argues that they did not fall especially heavily on the poor because the imposed conditions forced an increase in the efficiency of resource use and therefore actually benefitted the poor. What he neglects to consider is that the increased efficiency of resource use forced primary schools to introduce mixed grade classes and double shifts, cutting class time in half for most of the students and, in health care, forcing the aid agencies to cover a larger share of the rural health care services.

Table V 1 SENEGAL: MAIN ECONOMIC INDICATORS (all % change from previous year unless otherwise indicated by *)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Activity & Trade																				
Real GDP (1)	0.3	6.1	-5.6	2.8	8.2	12.2	-5.7	-6.7	10.1	-3.5	-1.7	14.9	2.2	-5.4	3.9	3.9	6.3	0.7	4.3	---
Real GDP/capita (2)	-2.0	3.7	-7.7	0.5	5.7	9.2	-8.3	-9.3	7.1	-6.2	-4.4	11.7	-0.6	-8.0	1.1	0.8	3.2	-1.9	1.4	---
Export volume * index (1)	63.6	102.1	68.5	78.4	97.6	117.1	128.6	79.1	82.9	75.0	73.7	100.9	118.5	109.4	100.0	121.5	108.4	---	---	---
Import volume * index (1)	71.6	80.5	80.4	83.6	82.3	96.8	108.3	99.6	103.0	88.9	104.2	103.0	113.0	112.8	100.0	124.0	120.3	---	---	---
Net terms of trade (1)	-6.9	4.2	-6.9	24.4	-7.2	-3.5	-1.1	-11.1	-0.1	-0.4	2.4	-5.8	1.8	4.1	-2.1	-11.8	7.4	1.7	1.7	
Wages & Prices																				
Real wages (2)	-3.8	-5.9	-10.0	-1.3	39.5	-1.0	-10.2	-3.2	-8.9	15.0	-0.8	-7.8	-10.4	3.0	-7.1	-6.0	4.5	0.0	10.9	---
CPI	3.9	6.3	11.1	16.6	31.8	0.1	11.4	3.3	9.8	8.7	5.9	17.4	11.6	11.8	13.0	6.4	4.3	0.0	-1.9	---
Money & Credit *																				
Domestic credit - public %GDP (1)	0.0	0.0	0.8	0.3	0.5	3.1	3.4	3.2	3.2	4.6	7.7	11.6	12.6	12.9	13.1	11.7	10.5	10.9	8.7	7.2
- private %GDP (1)	16.1	17.3	22.8	26.5	26.3	26.5	29.9	39.6	38.5	41.7	46.8	40.1	38.5	34.8	32.4	28.6	27.7	29.6	27.5	25.5
Money supply: M2/GDP % (2)	15.4	15.6	18.8	22.8	21.2	24.7	27.1	32.1	27.7	28.3	32.4	31.1	29.5	28.3	26.1	25.5	24.0	23.9	25.3	23.6
Discount rate % (1)	3.5	3.5	5.5	5.5	8.0	8.0	8.0	8.0	8.0	10.5	12.5	10.5	10.5	10.5	10.5	8.5	8.5	9.5	11.0	---
Imbalances *																				
Gov'nt deficit %GDP	-0.5	---	-2.7	---	-0.5	---	-3.1	---	-0.7	---	-3.4	-6.2	-6.0	-8.1	---	---	---	---	---	---
Internal imbalance % GDP (1)	3.4	1.2	5.5	-0.6	1.6	4.9	4.2	14.1	12.5	18.6	20.2	9.9	6.4	14.7	12.8	6.6	---	---	---	---
External imbalance % GDP (1)	2.7	-1.0	8.1	4.7	4.7	5.0	3.3	10.0	9.1	13.9	19.8	10.6	13.1	12.9	9.0	6.6	4.9	5.8	3.5	---
Exchange Rate & Debt *																				
Exchange rate CFA/USD (1)	5.4	2.0	13.0	-8.0	6.8	-10.8	5.3	11.2	3.8	-12.3	-27.3	-17.0	-24.1	-14.9	21.2	14.6	17.3	-13.5	4.5	11.4
External debt o/s (3)								0.1	1.1	---	1.4	1.7	1.7	2.1	2.7	3.4	3.3	3.5		
Debt service %XGS (3)									28.6	---	12.8	11.3	16.7	22.2	27.0	30.8	28.5	29.4		

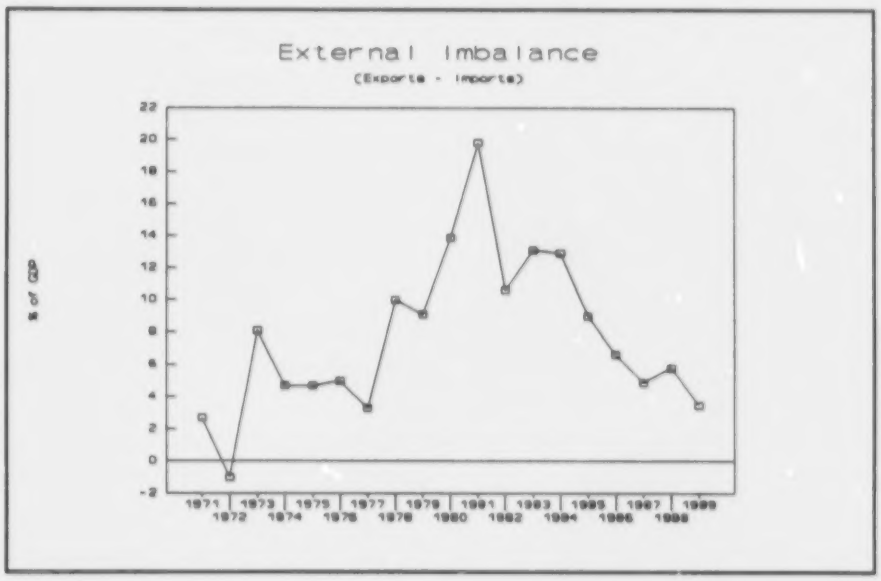
Sources: (1) IMF, International Financial Statistics
(2) Eliot Berg Associates
(3) World Debt Tables.

Figure V 2



Source: Table V 1

Figure V 3



Source: Table V 1

In both health care and education, expenditures had been steady from 1980 to 1984 but successive annual cuts have seen expenditure levels on education in 1989 fall to 75 percent of the 1984 levels. Per capita expenditures on health fell to 60 percent of the 1979-81 levels which were in turn 30 percent lower than the 1970 levels. In time this is bound to affect health indicators.

There has been no increase in formal employment since the early 1980s and in recent years there have been attempts to lay off public sector employees. Formal employment, at 200,000 or so, is in any case quite small. An estimated 45,000 or so new entrants join the urban labour market each year with few prospects. In 1988, there were riots prompted by the adjustment program and this led rapidly to a $50 million job creation program in 1989, designed to create 60,000 - 70,000 jobs by 1992. Real wages have fallen significantly over the last ten years, the minimum wage has been unchanged since 1985, and urban incomes are estimated to have fallen by 13 percent since 1980.

In his critical assessment of the reform program in Senegal, Berg argues that there has been little structural or institutional reform to suggest stronger growth might result in future. At the same time there is growing scepticism about the wisdom and efficacy of market oriented reform. He puts the indifferent record of implementation down to excessive foreign assistance, now totalling some $600 million per annum. This is about the same as export earnings; it finances all the state capital budget and is not much less than total government revenues. Foreign debt has also continued to rise, to $4.1 billion or 93 percent of GDP in 1989. This easy access to foreign resources, according to Berg, prevents more serious efforts at structural reform. It also mortgages the future.

3 THE FISHERIES SECTOR

Senegal enjoys a rich fisheries resource by virtue of its long coastline (over 700 kilometres), its location on an important continental shelf and at the confluence of major, nutrient-rich, sea currents. It has good port and repair facilities and a population long-skilled in fishing.

As a result fishing is extremely important in the economy of Senegal, in terms of foreign exchange earning, employment and consumption. In 1988 fish exports were the largest single earner of foreign exchange, bringing in $183 million or 30 percent of total commodity export earnings. An estimated 175,000 people earn their living, directly or indirectly, from the fishing industry and fish is an important source of protein in the daily diet of the people of Senegal. The fisheries sector has also been one of the most rapidly growing since independence and Senegal is now Africa's third most important fish producer.

There are two main fishing seasons, the less productive May to November season when warm water currents from the Gulf of Guinea move towards Senegal reducing the catches and from November to April when the up-welling of cold water currents, rich in nutrient salts, bring with them an abundance of fish stocks.

The fishing industry can be split clearly between the artisanal, or small scale, sector and the industrial sector. Aquaculture, including shrimp and oyster farming, has had little success in Senegal and is immaterial in terms of production volumes.

3.1 The Artisanal Sector

The artisanal fishery accounts for 70 percent of the total fish catch, 52 percent of the commercial value of fish harvests, and employs directly almost 48,000 fishers. The catching of fish is essentially a male occupation, while traditional processing and marketing, thought to employ perhaps another 150,000 people, is undertaken essentially by women [UNECA 1984].

3.1.1 Catching Fish

The means of production include motorized and non-motorized pirogues equipped with handlines, a variety of traditional nets or with (expensive) modern ring-nets. In general artisanal fishers own their boat and equipment directly except in the case of the ring-nets which are likely to be owned by a fish buyer or a retired civil servant. In the latter case the ring-net owner controls the fishers catch and gets 33 percent of the value of the catch to cover the use of the ring-net. Artisanal fishing is restricted to, and has a monopoly of fishing in, a zone located within 6 miles of shore.

The average total artisanal catch for 1987 to 1989 was 238,000 MT, a significant increase over the 1981-86 average of 156,000 MT, but still significantly lower than the 1974-76 average of 272,000 MT. The catch is expected to stabilize at current levels. Most of the fish caught in this sector are sardines and other coastal pelagic species such as mackerel, but about 16 percent are demersal (sole, mullet, turbot, etc.). Long term growth has been achieved through the motorization program. From 1972 to 1988 CAMP (Centre Assistance à la Motorization des Pirogues) financed a total of 6,705 motors and parts for them. As well, the introduction of the ring-nets resulted in a greater catch with much of the additional supply absorbed by the traditional processors and the fish meal plants.

Despite these recent innovations, the artisanal sector continues to be characterized by relatively simple technology and high value added (11 billion FCFA in 1987 or 314,000 per fisher). The cost of creating a job is 22 times lower than in the industrial sector and is estimated at 200,000 FCFA [CNPSP, 1989].

The majority of artisanal fishers are located in the regions of Zuiguincho, (33 percent), Thiès, close to Dakar (26 percent), and Dakar itself (25 percent). Thiès, however, accounts for two thirds of the catch and Dakar for 17 percent by volume and 34 percent and 43 percent respectively by value, suggesting a much higher average value of fish landed in Dakar [ONUDI, 1990 p. 12].

3.1.2 Processing the Catch

Artisanal processing includes drying, salting and drying, searing and more recently, smoking. The techniques used remain little changed since the 1950s. The sector is characterized by the lack of effective preservation methods and storage facilities, hence it is subject to climatic conditions, insects and theft. Storage facilities, for example, would enable the processors to store their finished product until the rainy season and thereby command better prices. Some attempts have been made to set up cold storage depots, with foreign assistance, but these have been plagued by high operating costs and maintenance difficulties [ONUDI, 1990, p. 30] and by inadequate revenue sources, [Brainerd, 1984], raising serious questions about their viability.

The margins of processors are generally slim and hence they do not have the financial resources to shift to other technologies. The vast majority of processors are women who, in turn, hire a small, predominantly male work force on a daily basis. In the past the processor was often a fisher's wife who would take responsibility for selling her husband's catch and processing whatever could not be sold fresh. With the advent of the more expensive ring-nets, buyers often own the fishers' catch, selling whatever they can fresh and then in turn selling what remains back to the fishermen's wives for processing. Fish traders sell the fish in local markets, go door to door, or sell to state-approved fish mongers (some of whom are also women) for distribution inland.

In recent years the processors and fishermen have begun to organize into GIEs (Groupement d'Intérêt Economique) in order to access credit through the CNCAS, (la Caisse Nationale de Crédit Agricole Sénégalais). Women processors have quickly proven to be the best clients with a near perfect repayment record.

3.2 The Industrial Sector

The industrial sector accounts for 30 percent of recorded fish production by volume, for 52 percent of the value of fish landed, and for almost all the exports of fish from Senegal. It employs about 10,000 people directly.

The industrial fishing fleet consisted of 220 trawlers, 59 tuna vessels and 9 sardine boats in 1989. The majority of these were owned by Senegalese but 81 trawlers were foreign owned. The average age of the domestic fleet was 22 years.

In 1989 a total of 102,000 tonnes of fish were caught by the industrial sector. Of this, trawlers landed 55,000 tonnes (54 percent), sardine boats 13,200 (13 percent) and tuna boats 33,636 (33 percent). The trawler catch consists essentially of demersal species (white shrimp, hake, sole, etc.) and also of cephalopods (cuttlefish, squid and octopus).

The industrial sector consists also of processing plants, fish meal plants and refrigerated storage units. This sector is plagued by numerous problems including lack of adequate supply, high proportion of low value fish, absence of credit facilities, high labour costs, high input costs, an aging fleet, low value added and plants operating with excess capacity and requiring major upgrading.

The processing facilities in 1987 included 40 shrimp and fresh fish processing plants, 2 tuna processing plants, 2 fish meal plants and 3 refrigerated storage units. Indications are that a minimum of ten processing plants have closed down since 1983 and those that remain are all operating at 40 to 50 percent of their rated capacities. Production costs continue to rise while export prices remain static or are dropping. Employment levels have steadily dropped since the 1980s. A typical processing plant would have a ratio of women to men ranging from 1:1 to 2:1 depending on the size of the plant.

Exporters are on their own when it comes to selling their product; there is no common marketing board or group effort. Exporters are not allowed to retain any of their foreign currency earnings; all must be converted domestically. Almost all of the industrial catch is destined for export markets.

Fish imports consist of a small amount of canned low value mackerel from Thailand (about 300 tonnes valued at less than $500,000) for domestic consumption but the overwhelming majority of imports (98%) are for fish processing and take the form of fresh and frozen tuna. In 1987, the tuna processing plants purchased two thirds of their raw materials from foreign vessels. These vessels are either owned by members of the EEC who pay a flat fee (3.25 billion FCFA in 1986-87) in addition to the fee based on reported volumes and boat size (261 million FCFA in 1986-87) paid by all foreign vessels. As well, EEC members contribute research grants (90 million FCFA) while all foreign vessels combined spend 1.5 billion FCFA in salaries and 800 million FCFA in repair and maintenance costs in Senegal.

3.3 Fish as Food

Millet, rice, fish and groundnuts are the basic foods in Senegal. The "thiébou dienne" (rice and fish) is a national dish eaten daily by the majority of the population. The 1989 per capita consumption of fish was 28 kg nationally with wide fluctuations depending on geographical location - 39 kg in Dakar and 0.2 kg in Kolda in the Southern interior [Republique du Senegal, August 1991, p. 25]. In the interior, rice is substituted by millet (and niébé) while lower fish consumption is made up by consuming more cereals and vegetables. In general, very little meat, fruit, vegetables and milk products are consumed. A study by Mathilde (1988) has shown that 80 percent of all animal protein consumed in Senegal comes from fish and this seems to be due to traditional eating habits, proximity to good fishing areas and difficulties with cattle farming due to long term drought.

3.4 The Interconnections Between Sectors

The structure of the whole industry is captured neatly, in all its complexity, in Chart V 1 by Foucault and Chabond. The first column reflects the relative importance of artisanal fishers, sardine boats, trawlers with ice-boxes, the more modern freezer trawlers, and local and foreign tuna boats.

The artisanal catch reaches the market by three routes: a small amount goes directly, 27 percent goes through artisanal and then wholesale processors, and the bulk is marketed in the form of fresh fish by wholesalers. Just short of 20,000 tonnes of the artisanal and sardine boat catch, or 8 percent, passes through factories for filletings, freezing and export, but on the whole, the artisanal sector is tightly integrated into the local market.

All of the catch of freezer trawlers and two thirds of the catch of ice box trawlers is exported directly without further processing. The other third of the ice box trawler catch joins the off-take of the artisanal sector for filleting and freezing in local factories before export.

Tuna boats channel their catch through local factories for canning and then export.

Just over one half of all exports by weight (including almost all tuna and fresh fish) are exported to Europe, 38 percent to Africa and 9 percent to Asia. Fresh and frozen fish account for about 44 percent of exports by value (two thirds by weight), crustaceans and mulluscs for 36 percent (13 percent by weight) and canned fish for 17 percent (16 percent).

3.5 Development of the Fisheries Sector to 1982

Artisanal fishing output peaked in 1975 at 278,400 tonnes and the number of fishers at 49,000 in 1976. Thereafter, production and the number of fishers declined sharply to 141,000 tonnes in 1982 and to 32,000 fishers in 1981. These represented falls of almost 50 percent and 32 percent respectively, with the average catch per fisher falling by 23 percent (see Table V 2).

The output of industrial fishing follows a different pattern, peaking in 1981 at 161,625 tonnes, up by some 90,000 tonnes since the mid 1970s. This increase was the result, however, of increased catches by foreign ships and the catches of Senegalese boats, in comparison, declined steadily between 1977 and 1980.

Table V 2 Fish Production in Senegal, 1973 - 1982

YEAR	INDUSTRIAL domestic	INDUSTRIAL foreign	ARTISANAL	TOTAL	Proportions: INDUSTRIAL domestic	Proportions: INDUSTRIAL foreign	Proportions: ARTISANAL	Proportions: TOTAL
	000 tonnes				percentages			
1973	76,558		227,261	303,819	25%		75%	100%
1974	84,225		262,813	347,038	24%		76%	100%
1975	74,168		278,433	352,601	21%		79%	100%
1976	74,211		276,259	350,470	21%		79%	100%
1977	52,073	77,811	211,082	340,966	15%	23%	62%	100%
1978	51,657	74,909	225,850	352,416	15%	21%	64%	100%
1979	48,273	66,082	187,769	302,124	16%	22%	62%	100%
1980	43,636	117,989	196,807	358,432	12%	33%	55%	100%
1981	52,359	28,430	147,723	228,512	23%	12%	65%	100%
1982	66,224	35,800	140,731	242,755	27%	15%	58%	100%

Source: Department of Oceanography and Maritime Fisheries.

Production patterns are closely interrelated. Foreign fleets over-fished pelagic species and out competed local fishers, both artisanal and industrial. Increased energy costs and outmoded equipment impeded local fishers, especially the industrial ones, while artisanal fishers confronted difficulties in obtaining wood for canoes and spare parts and supplies for motors. They also faced a deteriorating local market as real incomes fell. Indeed, per capita consumption of fish in Senegal is estimated to have fallen by 25 percent between 1977 and 1982 [ONUDI, 1990, p. 35]. The artisanal catch fell steadily as a percentage of the total, from 75 percent in 1973 to 55 percent in 1980.

Because it is the industrial sector which essentially supplies fish for export, net foreign exchange earnings from fish continued to rise to 1982, as shown in Table V 3.

Net exports rose by $84 million (163 percent) over this period. Imports of fish represent fish such as tuna purchased by local canners from foreign boats for canning and re-export. These fell sharply in 1982 as local production rose.

The industrial infrastructure was developed over a number of years through combined government, foreign and financial institution investment most of which came to an abrupt end in the early 1980s. From 1973 to 1975 three refrigeration units were installed, in 1978 a fish meal plant, from 1978 to 1983 five more refrigeration units, and between 1981 and 1983 three buying centres. All these investments were made with foreign money largely from Japan, Denmark, Canada and France.

Chart V 1

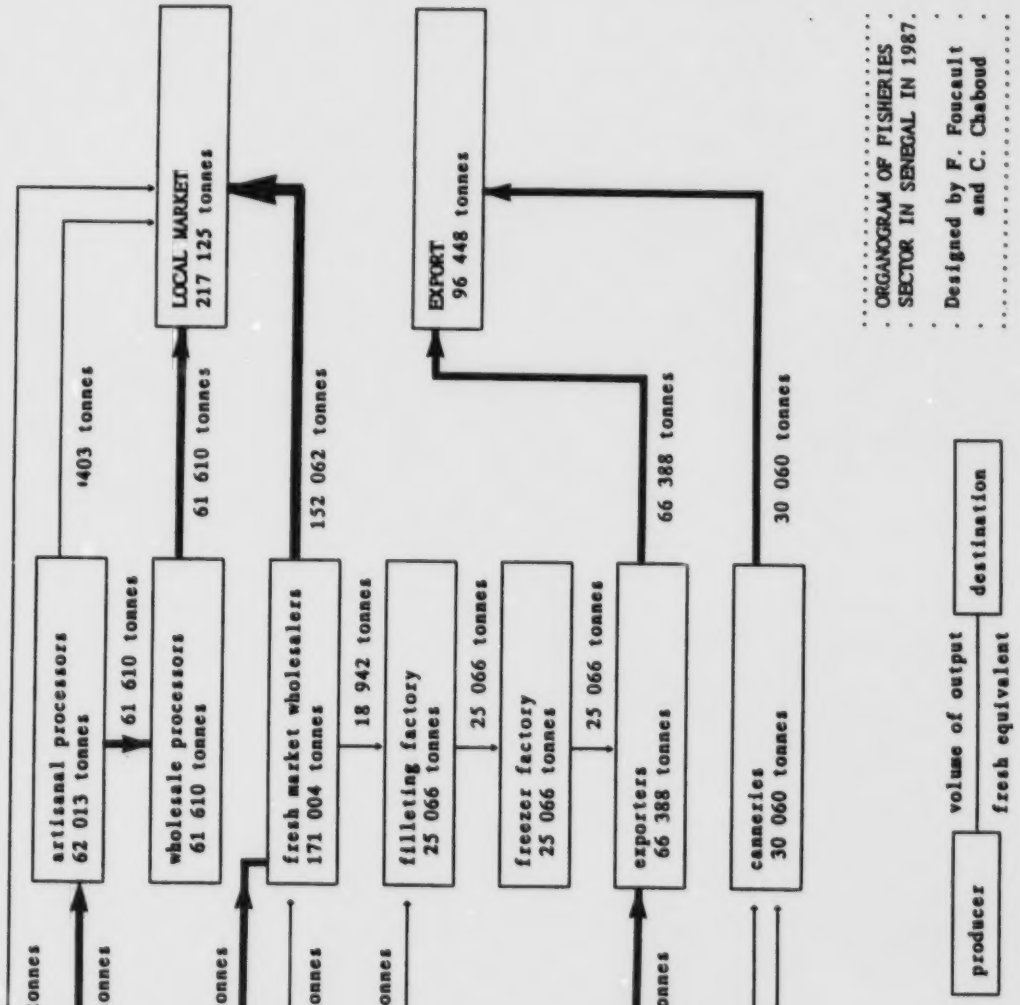

ORGANOGRAM OF FISHERIES SECTOR IN SENEGAL IN 1987.
Designed by F. Foucault and C. Chaboud
producer
volume of output
fresh equivalent
destination
artisanal fishers 231 272 tonnes
sardine fishers 4 805 tonnes
trawlers with ice box 19 318 tonnes
trawlers with freezers 28 128 tonnes
tuna fishers based in Dakar 10 908 tonnes
foreign tuna fishers 19 152 tonnes
3 080 tonnes
62 013 tonnes
166 199 tonnes
4 805 tonnes
6 124 tonnes
13 194 tonnes
28 128 tonnes
41 322 tonnes
artisanal processors 62 013 tonnes
wholesale processors 61 610 tonnes
fresh market wholesalers 171 004 tonnes
filleting factory 25 066 tonnes
freezer factory 25 066 tonnes
exporters 66 388 tonnes
canneries 30 060 tonnes
403 tonnes
61 610 tonnes
61 610 tonnes
152 062 tonnes
18 942 tonnes
25 066 tonnes
25 066 tonnes
66 388 tonnes
30 060 tonnes
LOCAL MARKET 217 125 tonnes
EXPORT 96 448 tonnes

Table V 3 Exports and Imports of Fish and Fish Products 1977-1983

YEAR	EXPORTS	IMPORTS	NET EXPORTS
	in millions of dollars		
1977	63.4	11.9	51.5
1978	75.5	15.6	59.9
1979	93.1	12.4	80.7
1980	103.7	20.6	83.1
1981	105.7	23.2	82.5
1982	148.0	13.1	134.9
1983	138.0	21.1	116.9

Source: FAO Fisheries Yearbook, 1987.

In 1982 a number of bilateral agreements expired and, thereafter, recorded landings of fish by the industrial sector and export earnings, fell sharply. Thus, by the early 1980s, as adjustment efforts were being attempted, both sectors of the fishing industry, industrial and artisanal, were experiencing severe problems.

A word of warning is in order here, though. Data quality for the 1970s is acknowledged to be poor. More recent data is felt to be more reliable but this means that trend developments over the two decades must be treated cautiously.

4 DEVELOPMENT OF THE FISHERIES SECTOR UNDER STRUCTURAL ADJUSTMENT

4.1 General

Between 1981 and 1989 fish production in Senegal increased by over 50 percent so that at the end of the decade production was approaching the levels attained in the latter half of the 1970s (Table V 4). Growth rates were high in all years and especially 1984, 1986 and 1987. By the end of the decade, however, production growth had slowed down.

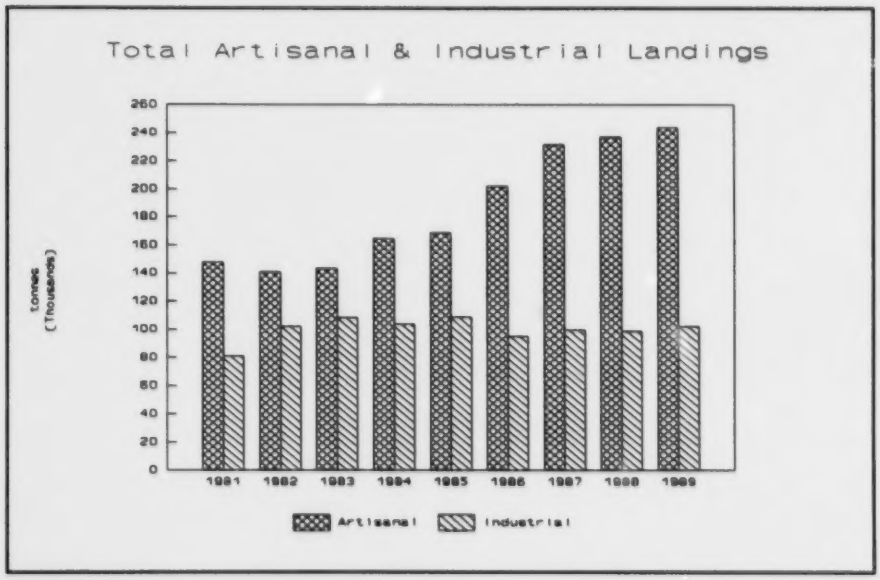
Output grew much faster in the artisanal sector than in the industrial sector, so that over the period the artisanal catch increased by 65 percent, the industrial by only 26 percent. Most of the industrial growth was accounted for by foreign ships, while the output of local industrial vessels rose sharply in 1982 and 1983, but has fallen steadily, by 25 percent, since then. The net result of this is that the share of the catch accounted for by artisanal fishers rose from 57 percent in 1983 to 71 percent in 1989, while that by local industrial fishers fell from 31 percent to 17 percent.

Table V 4 Fish Production in Senegal, 1982 - 1989

YEAR	INDUSTRIAL domestic	INDUSTRIAL foreign	ARTISANAL	TOTAL	Proportions INDUSTRIAL domestic	Proportions INDUSTRIAL foreign	Proportions ARTISANAL	Proportions TOTAL
	000 tonnes			growth p.a.	percentages			
1981	52,359	28,430	147,723	228,512	6.3%	23%	12%	65%	100%
1982	66,224	35,800	140,731	242,755	6.3%	27%	15%	58%	100%
1983	77,213	30,788	143,180	251,181	3.5%	31%	12%	57%	100%
1984	65,335	38,091	164,408	267,834	6.7%	24%	14%	61%	100%
1985	68,408	40,302	168,751	277,461	3.6%	25%	15%	61%	100%
1986	58,531	36,392	202,137	297,060	7.1%	20%	12%	68%	100%
1987	56,972	42,316	231,810	331,098	11.5%	17%	13%	70%	100%
1988	45,441	53,298	237,020	335,759	1.5%	14%	16%	71%	100%
1989	58,058	43,822	243,507	345,387	2.9%	17%	13%	71%	100%

Source: Department of Oceanography and Maritime Fisheries.

Figure V 3



Source: Table V 4

Fish and fish products were also the most rapidly growing export commodities, rising from $106 million in 1981 to between $330 million and $361 million in 1989. Net export earnings in dollars rose perhaps as much as fourfold over this period (Table V 5). As a result, while fish accounted for 19 percent of commodity exports at the beginning of the decade, at the end they accounted for about 30 percent. There is some question about how high export earnings were in 1989. The FAO estimate seems on the high side. Our estimate is based on a figure

of FCFA 100,513 million published by the Ministry of Fisheries in Senegal [August 1991] and is somewhat lower. This does not detract significantly from the growing contribution of the fisheries sector to foreign exchange earnings but it is more in keeping with interviews held in Senegal suggesting that export prices had fallen in the last two or three years.

Table V 5 Exports and Imports of Fish and Fish Products 1981-89

YEAR	EXPORTS $ M	IMPORTS $ M	NET EXPORTS $ M
1981	105.7	23.2	82.5
1982	148.0	13.1	134.9
1983	138.0	21.1	116.9
1984	142.1	16.5	125.6
1985	166.2	19.5	146.7
1986	259.1	18.6	240.5
1987	318.0	18.9	299.1
1988	325.1*	36.2	288.9*
1989	360.6**	36.6*	324.0*
1989	330.6**	36.6*	294.0**

Source: FAO Fisheries Yearbook, vol 69, 1990.

* FAO estimate.
** Our estimate.

The share of the fishing industry in GDP has risen from 2.0 percent in 1982 to 2.4 percent in 1988. These figures do not cover fish processing or marketing however, and hence grossly understate the importance of the fisheries sector. Using estimates by Brendel, Chaboud and Foucault (1991), value added by the whole sector in 1987 was close to FCFA117,000 million which was approximately 8.6 percent of GDP in that year. This was broken down as follows:

It can be seen that marketing and transport of fish dominated value added in this sector, accounting for 42 percent of the total, direct production for 28 percent, inputs for 18.5 percent and processing for only 2.7 percent.

4.2 The Artisanal Sector

In explaining trends in the industry, one must be cautious because of the poor quality of the data. In the artisanal sector, for instance, there are sharp fluctuations in numbers of canoes employed and at least three incompatible time series for the Fleet (Republique du Senegal, August 1991, p. 14; ONUDI, 1990, p. 15; and CNPSF, 1989, p. 6]. In what follows the latest time series is used except for non-motorized canoes in 1984 and 1985 for which the figures appear unreliable. They show a sharp rise in 1984 followed by a drop of almost 45 percent in 1985, said to be caused by ageing of canoes and problems in securing wood locally to replace them. This was not accompanied, however, by any fall in number of people fishing; on the contrary, the numbers are

reported to have risen (Table V 7). For these years, therefore, we use the ONUDI figures which seem more reasonable. All of the time series data for artisanal canoes suggest, however, that the number of motorized canoes fell sharply between 1982 and 1986. This was the time when the availability of motors, spare parts and supplies became a critical problem as export and import volumes fell and as external debt servicing grew more burdensome. Shortages of suitable wood, which has had to be imported from increasingly further afield, reduced the supply of both motorized and non-motorized canoes.

Table V 6 Direct and Indirect Contribution to GDP by the Fisheries Sector, 1987

	CFA m	% GDP
Artisanal fishing	21,252	1.55
Trawlers	7,745	0.56
Tuna boats	4,325	0.31
Fresh fish marketing, wholesal	14,391	1.05
Processed fish marketing	7,799	0.57
Artisanal processing	1,184	0.09
Filleting, freezing & canning factories	1,947	0.14
Export marketing	12,380	0.90
Supplies & services	13,141	0.95
Retailers	13,133	0.95
Transport	2,186	0.16
Petroleum products	8,775	0.64
Other	8,660	0.63
	116,918	8.6

Since 1985, however, a steady increase is reported in numbers of canoes, in the number and percentage of those motorized, and in the commercial value of the catch. The number of artisanal fishers has risen in all years since 1984 except 1988 and is now approaching the peak reached in 1976 (49,000).

Productivity per canoe and per fisher both fell significantly in the early 1980s, reflecting the problems discussed in the previous section. Since 1983, however, there has been a steady increase in both, to 1988.

This appears to be the result of a number of factors. The intense competition with the industrial sector eased after the early 1980s and during the decade the inshore fishing limit, within which industrial fishers are not allowed to operate, was raised from 3 to 6 miles from shore. The number of motorized canoes rose by one third between the early and the late 1980s, enabling more intensive fishing and longer expeditions, reportedly not confined to the inshore limit. Earlier problems of spare parts and supplies were resolved both by ingenuity on the part of fishers in securing them in neighbouring countries, and by CAMP becoming more organized. The wood supply problem seems also to have been solved. Finally, the more widespread use of purse seine or ring nets has also been an important contributory factor.

Table V 7 The Artisanal Fishery: Boats, Motors, Fishers and Value of Output 1980-1989.

Year	Number of Canoes Total	% Motorized	Number of Fishers	Commercial Value of Catch
	#		#	'000 FCFA
1980	8,485	54.4	30,707	--
1981	9,111	54.1	31,725	--
1982	9,125	52.6	33,280	14,351
1983	8,545	62.2	40,500	14,475
1984	8,176	63.2	39,839	15,731
1985	6,640	54.9	41,770	17,100
1986	7,621	63.0	43,614	21,441
1987	8,561	68.1	46,021	23,304
1988	8,623	72.0	45,217	23,848
1989	10,005	64.2	47,761	24,935

Source: ONUDI, 1990 and CNPSF, 1989.

Table V 8 The Artisanal Fishery: Some Measures of Productivity

year	output per canoe (tons)	output per fisher (tons)	commercial value of catch (a) per canoe 000 FCFA	(b) per fisher 000 FCFA	(c) per ton 000 FCFA
1980	23.2	6.4	--	--	--
1981	16.2	4.6	--	--	--
1982	15.4	4.2	1,573	431.2	101.9
1983	16.8	3.5	1,694	357.4	101.1
1984	20.1	4.1	1,925	394.9	95.6
1985	25.4	4.0	2,576	409.4	101.3
1986	26.5	4.6	2,813	491.6	106.1
1987	27.1	5.0	2,722	506.4	100.5
1988	27.5	5.2	2,765	527.4	100.6
1989	24.3	5.1	2,492	522.1	102.4

Source: Our calculations and sources in Tables V 4 and V 7.

The attractiveness of adopting motorized canoes and purse seines has been demonstrated by Brainerd [1984], who showed that annual income per canoe increased by FCFA 271,000 by motorization and by FCFA

3,936,000 by both motorization and the purse seine or ring net. Income per fisher increased by FCFA 39,000 per annum with motorization and by FCFA 218,000 per annum with both motorization and purse seine.

In spite of recent improvements, productivity levels remain well below those of the late 1970s however, and in 1989 appear to have dipped a little, which is one reason why observers feel the artisanal industry has probably reached its maximum size.

It is interesting to note that the commercial value of the catch per canoe rose steadily to 1986 but has been falling since then, suggesting diminishing returns. The commercial value per worker rose significantly (from 1983 to 1988) but fell off in 1989. These trends had less to do with the average value of the catch per tonne than with changes in the productivity per canoe and per fisher.

There have been several studies of the cost structure and profitability of the artisanal fishing industry, from 1975/77 [Brainerd, 1984] to 1987 [ONUDI, 1990]. Comparisons are fraught with danger, but Table V 9, if valid, reveals some interesting developments in the artisanal fishing sector over the decade covered by the data. The most striking development is that variable costs have more than doubled. Most of the increase is accounted for by fuel, the price of which rose from 55 FCFA to 170 FCFA per litre. The use of fuel has also obviously increased as the distance to the resource has lengthened. Wage costs increased by 16 percent and repairs and maintenance by 93 percent.

While the average catch per boat and the landed price of fish were both higher in 1987, this was more than offset by cost increases so that net revenue actually fell over the period. Once inflation is allowed for, the fall was substantial, amounting to approximately two thirds. Yet profits remain high even as a percentage of total fixed and working capital and earnings from fishing are reported to be much higher than in agriculture [Chauveau and Samba, 1988].

These declining returns are echoed in Table V 10 for the commercial value of artisanal fish per tonne in constant 1982 prices. These show a decline of one third over the period suggesting that the large expansion in the output of artisanal fishermen (due largely to a 20% increase in the number of fishers between 1985 and 1989) has been responsible for a fall in the real/relative price of fish. Fishers may, indeed, have attempted to raise their catch in recognition of this trend in order to try to stabilize their income.

Improved productivity per canoe has helped maintain the real value of the catch per canoe above 1982/84 lows. The real value of the catch per fisher has improved since 1985 but remains well below that of 1982.

A common complaint in the artisanal sector is that it lacks ready access to credit on reasonable terms. The absence of such facilities has been responsible for buyers and others providing such expensive capital items as boats, motors and, especially, ring nets. This then gives these non-fishers a claim to the catch. In the case of fishers using traditional nets, net revenue would usually be distributed as follows: one quarter-boat owner, one quarter-motor owner, one quarter-net owner and one quarter-shared equally among the hired hands. For fishers using ring nets (two boats and two motors are needed), net revenue would be distributed as follows: one third-ring net owner, two fifteens-each boat owner, two fifteens-each motor owner,and two fifteens-shared equally among the crew (normally 28 people)!

Table V 9 Annual Production Costs and Revenues for Motorized Purse Seine Operations Artisanal Fishery, Senegal 1975/77 and 1987

	1975/77	1987
No. of trips/year	278	250
Average catch/trip (tonnes)	2.00	2.50
	('000 FCFA)	
Fixed Costs:	1,067	1,753
Boat	150	120
Engine	250	300
Gear	667	1,333
Variable Costs:	6,307	13,764
Fuel & lubricant	902	7,054
Labour	4,805	5,550
Repairs & maintenance	600	1,160
Total Costs	7,374	15,517
Total Catch	542.80 tonnes	625.00 tonnes
Average Total Cost	13.59	24.83
Average Variable Cost	11.62	22.02
Total Revenue	15,318	21,875
Average Revenue	28.22	35.00
Net Revenue	7,944	6,358
Gross return (a) on Capital Invested	199%	110%
(b) on Total Capital (fixed & working)	77%	32.5%

Source: 1975/77 Brainerd, 1984
1987 ONUDI, 1990.

The financing of ring nets by buyers, however, has further implications for industrial organization. Whereas traditionally, the fisher's wife would be responsible for selling the fresh catch and processing/selling any fish not sold fresh, the buyer now controls the catch and the fisher's wife has to buy from the buyer at a higher price. Financing of ring nets has secured the status of buyers and has, reportedly, reduced the net earnings of the women involved in buying and processing, although it was impossible to confirm this.

Table V 10 Commercial Value of the Artisanal Catch in Real Terms (1982)

Year	CPI Index	FCFA per Tonne	Real Commercial Value per tonne	Real Value of Catch per Canoe	Real Value of catch per fisher
				('000 1982 FCFA)	
1982	100	101.9	101.9	1,573	431.2
1983	111.6	101.1	91.4	1,518	320.3
1984	124.8	95.6	76.7	1,543	316.5
1985	140.9	101.3	71.9	1,828	290.6
1986	150.0	106.1	70.8	1,875	327.8
1987	156.5	100.5	64.3	1,739	323.6
1988	156.5	100.6	64.3	1,767	337.0
1989	153.4	102.4	66.8	1,625	340.4

Source: Authors' calculations.

As mentioned earlier, processors are beginning to organize into GIEs and especially since 1988 with the establishment of several artisanal fisheries development projects. Pro-Pêche (to which CIDA contributes $14 million and the Canada-Sénégal Counterpart fund $3 million) consists of two components. ATEPAS seeks to improve fishing and processing equipment, techniques, organization, efficiency and profitability. Servi-Pêche is designed to encourage "auto-development" among groups, facilitating credit and encouraging savings, and by offering a range of technical assistance. Through the efforts of Pro-Pêche/Servi-Pêche, la Caisse Nationale de Crédit Agricole Sénégalais was persuaded to lend money to two fisheries development projects, PALMEZ and PAPEC, in 1988. The first formal credit to this sector in over 5 years, these were guaranteed by the African Development Bank but repayment was abysmal. Since then Pro-pêche has provided guarantees and draws on its technical assistance capacity to support the credit process. By October 1991, 262 loans had been made for FCFA 339 million, for equipment for fishers, processors, buyers and retailers and for working capital for processors, retailers and buyers only. The loans are for 18 to 24 months; FCFA 140 million has already been repaid but of the FCFA 198 million outstanding, 105 million is in arrears.

Given the small size and short maturity of the loans, it is clear that they are not being used for purchasing boats or ring nets, so they do not address the problem of long term capital. Neither do they address the very short term, one day to one month credit needs of the industry, especially those of fishers, who continue therefore to use informal credit supplies, usually from merchants, and reportedly often at exorbitant interest rates. Nonetheless, the Pro-Pêche initiative is important, especially for groups of women processors. Also, as Chaboud and Kebe [1989] have pointed out, fishers may continue to rely on informal sources of credit for working capital, even if a suitable "modern" source is made available, for complex social reasons of stability and reciprocity.

The government grants tax exemptions on gas and other imports used by the artisanal sector.

4.3 The Industrial Fishery

Since the large drop in 1980/81, industrial output has remained reasonably stable in the 100,000 ton range. The composition of output has changed, however. Both the trawler catch and the output of tuna recovered strongly to 1985. This was explained in both cases by a significant increase in the catch per boat over 1981 levels. Since 1985 the trawler catch has fallen, even as the number of trawlers has increased, so that the average catch per trawler has declined by one third since 1985. The pattern for tuna is not dissimilar, the number of boats being 28 percent higher in 1989 than in 1985, the catch 9 percent lower and the average catch 29 percent lower. The tuna figures are, however, more erratic with output for the decade peaking in 1987/8 (Table V 11).

Table V 11 The Industrial Fishery: Boats, Catch and Catch per Boat

	Trawlers			Tuna Boats			Sardine Boats		
	Catch (tonnes)	Boats (number)	catch per boat (tonnes)	Catch (tonnes)	Boats (number)	catch per boat (tonnes)	Catch (tonnes)	Boats (number)	catch per boat (tonnes)
1980	121,766	192	634.2	24,407	75	325.4	15,452	17	908.9
1981	42,895	175	245.1	19,469	67	290.6	18,425	14	1,316.1
1982	52,965	186	284.8	26,158	46	568.7	22,901	19	1,205.3
1983	56,734	168	337.7	28,850	48	601.0	22,416	20	1,120.8
1984	60,774	163	372.8	34,687	58	598.1	7,965	12	663.8
1985	68,452	185	370.0	36,132	46	785.5	4,126	8	515.8
1986	60,413	179	337.5	32,385	59	548.9	2,124	5	424.8
1987	57,854	187	309.4	39,413	51	772.8	2,020	3	673.3
1988	52,738	217	243.0	41,759	66	632.7	4,242	5	848.4
1989	55,074	220	250.3	33,626	59	569.9	13,180	9	1,464.4

Source: Republique du Senegal, Août 1991 and our calculations.

The sardine catch rose steadily from 1981 to 1983 but thereafter virtually collapsed. Output fell by 90 percent to 1987 and only three boats remained out of 20. The average catch per boat in 1986 was only one third that of 1981. Since 1987, the number of boats and output have risen but remain well below the 1980 level. Output per boat was, however, higher in 1989 than at any other time in the decade.

In general, these figures confirm the view that the industrial fleet is plagued by old age and disrepair. A number of factors reinforced these problems during the 1980s. The first is relatively low prices for fish [ONUDI, 1990, p. 15]. No data is presented to substantiate this argument as no clear time series for fish prices appear to exist. Estimates of the value of the total catch, however, show a sharp decline after 1986, especially in real terms (Table V 12). This cannot be explained by shifts in the composition of the catch as export data shows that the importance of higher value crustaceans and mulluscs increased over this period.

Table V 12 The Industrial Fishery: Value of Output Per Tonne

	Value of Catch '000 FCFA	Value per tonne FCFA	Real Value per tonne FCFA
1985	28,026	257.8	257.8
1986	27,568	291.5	273.8
1987	27,031	272.2	245.1
1988	27,120	272.2	245.1
1989	23,142	227.1	208.6

Source: Republique du Senegal 1991 and our calculations.

Table V 13 Returns to Various Types of Fishing Boats, 1987

	Sardinelle Old	Sardinelle Freezer	Trawler Old	Trawler New, freeze	Tuna Boats Old	Tuna Boats New
Revenues	50,425	109,620	92,448	170,940	144,000	202,860
Input costs	39,647	55,514	51,564	71,820	72,472	77,158
Fuel	6,375	13,860	16,632	41,580	16,632	29,753
Total costs	75,374	112,672	100,370	98,070	131,460	170,841
Wages	13,158	13,158	24,306	26,250	29,588	31,808
Interest	14,569	36,000	15,750	40,500	18,900	50,625
Net Profit/loss	-24,948	-3,052	-7,922	23,370	12,540	32,019

Source: ONUDI, 1990.

Estimates of the return to various types of industrial boats in 1987 show that all types of sardine boats and all but the most modern of trawlers would have lost money in that year. Factors held responsible for this, apart from depressed fish prices, were the high cost of fuel and the high interest charges. Naturally, when net revenues are low or negative, fishers will point to any costs which appear to them to be high. Yet Table V 13 shows that it was precisely those types of boats with the highest fuel and interest costs which were profitable in 1987.

Marginally lower interest rates would have made a difference between profit and loss only to freezer-type sardine boats; a 25 percent reduction in fuel and interest costs would have wiped out losses for old trawlers, but zero prices for fuel and credit would have been insufficient to do the same for old sardinelles. There is, in any case, already a 30 percent subsidy in the price of fuel [American Embassy, October 1990]. It seems, therefore, that productivity and age of boat as well as product prices might be more instrumental factors in explaining net profitability.

For the sardine fleet, which has been virtually replaced by the artisanal catch, the problems are even more complex. These are said to be "aging boats, the low motivation of the crews, bad management and maintenance of the fleet, lack of access to credit, and marketing problems" [Ibid].

Aging of the trawler fleet is also a pronounced and growing problem. In 1988, 82 percent of the fleet was over 16 years old, and one third over 25 years compared with 54 percent and 15 percent respectively in 1983. The lack of long term credit for fleet replacement is a major problem, made worse by the recent (1988) closure of the only institution providing any - SOFISEDIT (Societe Financiere Senegalaise du Developpement Industriel et Touristique). Creation of credit institutions to address this problem is an important component of the 1991 Program of Action for the fisheries sector.

More recently, there have been further pressures on industrial fishers. The extension of the artisanal fishing zone has forced fishers further from their base. Disputes with Mauritania and Gambia have made fishing in these waters almost impossible and recent increases in fees charged by Guinea-Bissau have resulted in a drop in the number of licenses to Senegalese-based boats from 15 to 5.

Although no figures are available, verbal reports suggest that fish prices have been rising significantly in the last two years. This appears to be the result of competition for fish between local and export markets, and pressure on the resource base due to increased artisanal fishing, more trawlers and more activity by foreign off-shore fleets. These factors are difficult to quantify but it appears that the large drop in the catches of foreign ships recorded in 1980-81 might be, to some extent, fictitious. Policing of foreign ships leaves much to be desired. Also, there has been a shift in the composition of the trawler fleet to freezer boats which export directly rather than off-loading in Dakar and there is uncertainty about whether this catch is recorded accurately [American Embassy, October 1990].

Competition between fish for local consumption and fish for export is undoubtedly growing with implications not only for the income of fishers, but also for nutrition and the resource base. It is to a consideration of these that we now turn.

4.4 The Competition Between Food Consumption and Exports

As noted earlier, according to UNIDO, the per capita consumption of fish fell sharply in Senegal in 1983. Since then it has reportedly fallen further, from an average of 26 kg per head to about 23 kg [ONUDI, 1990 p. 34]. This estimate is consistent with that of the FAO which shows a drop from 24.9 kg per head in 1984-86 to 21.3 kg per head in 1986-88.

We are, however, unable to reproduce these figures from data published by the government as the trend in the artisanal catch would suggest rising consumption per capita.

Verbal reports in Senegal suggest, however, that the export effort in the last two years is cutting into fish availability in local markets and forcing consumers to reduce their consumption at least of preferred species. It is reported that when plant buyers enter the local market offering prices over three times those paid by local consumers (FCFA 2000 versus 600), the species involved simply cease to be available for local consumption. Exports rose strongly between 1986-89, by 26 percent, but, the average value per tonne fell by 11 percent. An ongoing complaint in Senegal was that export prices had continued to fall, especially from the time of the Gulf War. If SAL IV delivers on its promise to strengthen export incentives it can be expected that there will be increased competition for landed fish, rising producer prices and reduced local consumption.

4.5 Pressure on the Resource Base

There is a growing body of evidence that the fishing industry is pressing up against natural limits in certain species and certain regions. Already by 1987 it was estimated that the artisanal sector was fishing about 80 percent of its limit. This included fishing 74 percent of its sardine limit, 90 percent of its prawn limit (almost entirely in Casamance region in the south) and 41 percent of its cuttlefish limit [ONUDI, 1990, p. 10].

The industrial sector was, by comparison, barely using its inshore pelagic limit (essentially sardines), fishing about two thirds of its tuna limit and 52 percent of its demersal limit. In the last category, however, it was fishing 80 percent of its prawn limit and 233 percent of its cuttlefish limit.

These figures were based on an estimated output of only 261,000 tonnes in 1987, 171,800 of which was artisanal and 89,250 of which was industrial. More recent government figures used earlier (Table V 4) are much higher, and put total production at 331,000 tons, of which 232,000 were artisanal and 99,000 industrial. If these figures are accurate, then the artisanal sector was probably over-fishing its sardine and prawn limits.

At the same time, if industrial catches are under-reported, as claimed, and if it is true as the Government of Senegal claims, that selective retention of fish by foreign trawlers means that the actual catch is up to three times that recorded [American Embassy, October 1990], then the pressure on demersal stocks is also much greater than anticipated. Illegal fishing is a recognized problem, with ships from Korea, Japan, USSR, Eastern Europe, China, France and Spain being the culprits. Senegal has had difficulty dealing with this. The opening of a second naval base at Elinkine in the South in 1989 should help. The air patrol, funded by CIDA, is an important part of the resource management system but was out of commission for eight months in 1989/90 due to insurance problems. Policing, therefore, has been a problem.

The 1987 Fisheries Code tightens up on resource use at sea and at dockside. It set the six mile artisanal zone, regulates net sizes, provides for inspection of boats, and provides for fines for non-compliance. But these regulations are only as effective as the policing which is impeded by budgetary problems. Budget problems are particularly acute. Expenditures on fisheries protection, surveillance and licensing have fallen from FCFA 194 million in 1987-88 to only FCFA 44 million in 1990-91, a drop of 77%! [M. Kebe, pers. comm. 1991].

What makes the situation even more complicated is that resource exploitation is uneven geographically. In the Northern zone (St Louis/Dakar) pelagic resources were under-exploited by an estimated 20,000 tonnes in 1990 [Republique du Senegal, 1991]. It is in La Petite Cote zone (Dakar/Joal) that artisanal fishing is concentrated and the actual catch is considered to exceed optimum exploitation. In the distant Casamance zone (Kafountine/Kabrousse) the estimated under-exploitation was 40,000 - 60,000 tonnes in 1990.

In short, there appears to be pressure on sardines, cephalopods and such demersal species as white shrimp and mullets. There is little or no scope for increasing output of these in two of the three zones, some leeway for raising output of less popular species, and some excess capacity in Casamance but access to this is impeded by distance and cost.

Current government policy towards the fishing sector does not appear to recognize these constraints. If the 1991 Action Plan is successful in creating a national trawler fleet, increasing the productive capability of the artisanal fleet, and extending the market for fish, the long term effect on the fisheries resource could be disastrous.

There are also passing references to industrial pollution having an impact on inshore fishing, but these reports are sketchy so it is not known how great this problem is [CNPSF, 1989, p. 24].

4.6 The Industrial Processing Sector

The processing sector in Senegal underwent a severe contraction in the 1980s because of a greater incidence of at-sea processing and because of deteriorating competitiveness of Senegalese factories. Since 1983, no less than 10 factories have closed. Of the five major factories operating in 1987, one, SADAL, has since closed down.

In the tuna canning sector, for instance, only two factories remain from the 11 operating originally [Berg, 1990, p. 118]. The industry suffered from supply shortages caused by the greater use of canning ships, over-fishing and competition with Côte d'Ivoire. German and British markets were lost due to poor quality control, and costs of production were high due to poor labour productivity and high energy costs. Some French vessels also shifted to the Indian Ocean. From being the world's second largest exporter of tuna in 1976 with 12 percent of the world market, by 1986 Senegal had slipped to fifth place with only 6 percent. In all markets but France, Senegalese tuna was replaced by that from Thailand. This was in spite of an export subsidy of 10 percent FOB and duty-free entry into the EEC, while Thai tuna earns no subsidy and faces duties of 24 percent [Berg, 1990 p. 71]. Thai labour costs per unit were one half of those of Senegal while transport costs to Europe were 70 percent lower. Even neighbouring countries are more competitive. Thus, although wages in Senegal were 10 percent lower than in Côte d'Ivoire, productivity per hour was more than 50 percent lower, causing some transfer of tuna canning [Berg, 1990, p. 12, 118].

Unit labour costs are high for a number of reasons. First of all, although processing is seasonal, more than two thirds of the labour employed in 1987 was effectively permanent. Secondly, the throughput of fish is inadequate so that most factories have significant excess capacity. Freezer factories for instance were operating at only 45 percent capacity in 1987 due to shortage of fresh fish [ONUDI, 1990 p. 21,22]. Canneries were operating at about 58 percent capacity and fishmeal plants at only 25 percent.

The low level of throughput dominates the productivity picture, although Berg prefers to emphasize instead labour laws which allow women processors to sit while working, and which, according to him, give workers excessive time off for holidays and high mandatory payments not related to productivity [Berg, 1990, p. 118]. Workers would, of course, be appalled at these criticisms of what in the industrialized countries would be standard working practices.

Fish processors receive favourable tax treatment in that their imported equipment, raw materials and semi-finished inputs, which were in any case allowed in at relatively low rates, totalling 25 percent, are now, under SAL IV, allowed in duty free. The fish export industry being considered "un point franc". The export subsidy was initiated in 1981 at 10 percent of f.o.b. value and raised in 1983 to 15 percent. This was subsequently changed, in 1986, to 25 percent of value-added causing enormous bureaucratic complications.

Berg suggest that the export subsidy has not been effective, yet calculations of pro-forma costs and revenues for different types of factories operating in 1987 show that both freezer operations and tuna canning would make a profit at prevailing rates of capacity utilisation only because of these subsidies [ONUDI, 1990, p. 59-65]. Indeed, for the former, the subsidy represented the equivalent of about one half the wage bill, and for the latter,

more than 100 percent! A more serious problem, therefore, is the complaint that no subsidy payments have been received by fish exporters since 1989 due to the government's fiscal problems.

This would seem to indicate a large flaw in the government's current economic policy; namely that its fiscal situation is too tight to permit it to pursue its surrogate exchange rate policy through export subsidization. Unless this is rectified, the adjustment program is likely to encounter serious problems and export potential and past export growth may be eroded.

No precise figures are available for the import content of processing. For tuna canning, this appears to be about 42 of total costs or 47 percent of pre-subsidy f.o.b. revenues [ONUDI, 1990 p. 63-67]. Most of this is tuna imports and oil. For other factories, the import content is much less and possibly only about 10 - 15 percent of total costs (ignoring capital costs). Net foreign exchange content of sales is, therefore, very high.

Shortage of credit to modernize plant and machinery has also been cited as a problem as have high interest costs, but the pro-forma statements do not support this latter point (interest being only 0.3 percent of the total costs of a freezer operation, and only 1 percent of those of a cannery). Finance for upgrading of facilities is considered a pressing requirement, mainly because of the need to meet new EEC sanitation standards. Some factories have already begun upgrading. Africamer, a joint Italian/Senegalese firm did so in 1987/88 and the French/Senegalese SNCDS has begun doing so more recently. Precise information is not available, but the Statistics Bureau reports unofficially that investment in the canning sector remained below 1985 levels to 1989. Investment in other types of factories rose sharply 1987-88 to between 2 and 4.6 times the 1985 level (which must, of course, have been extremely low), but fell below those levels in 1989. Total investment in all types of factories rose from FCFA 1.5 billion to 2.99 billion between 1987 and 1988. Factories are also diversifying production to increase throughput and stabilize and widen markets.

Direct government funding of the industry ceased in the early 1980s, and SOFISEDIT (Societe Financiere Senegalaise du Developpement Industriel et Touristique), the only institution providing credit to the sector, albeit in limited amounts, was closed down.

4.6 Overall Assessment Structural Adjustment and Fish

It is not possible to say with any precision what impact structural adjustment measures have had on the trends observed above but a number of observations are in order.

The supply and service difficulties facing the artisanal sector seem to have ameliorated after 1986, enabling the rapid growth in artisanal output. In so far as improvement in external balance was induced by economic policy, one could argue that the adjustment program was beneficial to the fisheries sector. It may also be that aid inflows to this sector, such as Canadian assistance in fisheries management or Japanese assistance for motorizing the artisanal fishery, were to some degree dependent upon the government adopting economic reform generally. But this is speculative. The renewal of economic growth after 1985 probably enabled absorption of the increased artisanal production, preventing further erosion in the real value of the catch per tonne.

Duty drawbacks and export subsidies have been more important than is usually acknowledged for the industrial sector, since without them few factories would have avoided losses. This is not to deny that their level was

inadequate and especially after the decision to move from an f.o.b. basis to a value added basis. Indeed, this move may have been a significant contributory factor reducing industrial sector capacity in 1987-89. On the basis of UNIDO's pro forma cost and revenue structures for various types of factories, the change in the subsidy base would have reduced payments to a 2,000 tonne freezing plant by FCFA 27 million, or by enough to create losses after subsidization. Likewise, an 8,000 tonne tuna canning factory would have received almost FCPA 500 million less, turning an after subsidy net return of FCFA 675 million into one of only FCFA 181 million. This, of course, is because of a low rate of direct value added by this sector.

Also, adding to the problems in the period 1985-88 was the fact that the real exchange rate in Senegal appreciated by up to 16 percent relative to 1980 when the subsidy was introduced (i.e. because inflation rates in Senegal were higher than those in France). This period saw an erosion in competition, therefore, which more than offset the subsidy which, on the value added basis, was worth no more than 3 percent of f.o.b. exports.

Of course, by 1989, the non-payment of the subsidy due to fiscal problems simply compounded problems and demonstrated either an internal consistency in the adjustment program between "exchange rate" policy and fiscal policy or a failure of management by the government.

Export growth in the fisheries sector has proceeded in spite of what many observers see as quite inadequate incentives [Berg, 1990]. This has been less critical since 1987 as the inflation rate in Senegal has fallen relative to that in France, effectively devaluing the currency, but the general point remains valid. The result of this is that industrial capacity has been reduced and only the most efficient processing plants have been able to invest.

SAL IV is putting much more emphasis on export incentives, has abolished taxes on inputs and, apparently, raised export subsidies to the equivalent of 7.5 percent of the f.o.b. value of processed exports. It is, of course, much too early to judge the effects of these measures. Nonetheless, there is some evidence that the fishing industry has become much more competitive since the start of the adjustment program in the mid 1980s, although we are not in a position to judge the quality of this evidence. Thus, the Statistical Bureau [CDPS, 1991] made available tables which show that the effective rate of protection for both canning and processing factories fell sharply between 1986 and 1991, in some cases from in excess of 100 percent to less than zero. The domestic resource costs (the local costs of saving or generting a unit of foreign exchange) fell from well in excess of 1 to the 0.5 - 0.7 range, and value added in world prices rose sharply in all cases. If accurate, these are all indications of increasing efficiency and competitiveness and would indicate that the adjustment programs have had considerable impact. It is not clear, though, that this increasing economic efficiency is translated into improved financial performance given the reports of the non-payment of the export subsidy.

Another major emphasis in adjustment programs since 1985 has been labour market reform designed to reduce labour costs. Understandably, trade unions have resisted the implementation of these measures which would reduce security, wages and the quality of working conditions. The result was that to 1990 little progress was achieved, although SAL IV attempts to push the matter more strongly and government appears to be going along with this.

There was some reduction of fuel costs in 1986 directly attributable to the adjustment program. Electricity costs fell by 8 to 18 percent but there were some offsetting increases in charges with the result that net relief was not substantial [Berg, 1990, p. 132].

The state reduced its direct involvement in the sector by privatizing two companies, Senegal Seafood and Thoniers Transoceaniques prior to 1987. No direct state investment in the industry has taken place since the early 1980s, but the government continues to support artisanal fishing through CAMP and has a part interest in the SNCDS tuna cannery. The adjustment program did nothing, however, to address the felt need for long term credit by both the artisanal and industrial sectors and may, indeed, have been responsible for the closure of SOFISEDIT. There are plans for new credit/guarantee agencies but these have been around for some years without any apparent progress towards their realization.

High interest rates have been cited as a problem but do not appear to be a significant factor in the cost structures examined.

Cutbacks in government spending have had important implications for the export subsidy program and may also be partly responsible for widely voiced concerns about tardiness in processing tax rebates. They are known also to have impeded the government's ability to monitor and police resource use. At the same time, the inability to use exchange rates to shape incentives leads to fraudulent use of tax exemption schemes. It is estimated that 40 - 50 percent of tax free purchases (gas and other imports) claimed by the artisanal sector are used for purposes other than fishing. This too may explain delays in processing applications for tax relief.

The biggest source of concern with the adjustment program is, however, what it will mean for the resource sector if production is raised to adjustment plan levels of 410,000 tonnes. Even on the basis of existing data, which is acknowledged to understate resource use, some species in some regions are already over-fished. There is no monitoring of the artisanal sector and only inadequate monitoring elsewhere. A 20 percent rise in production could well lead to serious over-fishing of certain species and it is not clear that the government has the management capacity to avoid this.

Furthermore, if export incentives are raised, as promised, the competition between the artisanal and industrial sectors for produce will increase. Already it appears that both ignore the zonal boundaries set for them [Republique du Senegal, 1991, p. 58]. Any resulting increases in prices for artisanal fish will simply add to resource pressures. The competition for fish between local and export markets, which observers claim is already evident, will serve to put further pressure on local consumption of fish unless switches can be made easily from preferred to other species.

Any attempts by government to grant additional incentives to the industry, either through improved direct assistance in the form of credit or new technologies, etc., or through subsidies or effective exchange rate depreciation, must therefore be accompanied by tighter management and regulation of the industry. Expansion of net output must concentrate on under-fished species and reduction of waste.

5 FUTURE RESEARCH PRIORITIES

The government of Senegal is already involved in a number of research studies under its 1991 Action Plan. Together with UNIDO it is undertaking an extensive study of the industrial fishing sector while, with the African Development Bank, it is examining the restructuring of the industrial fishery.

Le Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT) and the Ministry are undertaking a comprehensive review of the economics of fisheries, examining and developing polices in the areas of regulation, price, credit and budgetary impact, as well as social and investment policies [Republique du Senegal, 1991 p. 55-57].

Any proposals for further research ought to be developed alongside of and not in competition with these initiatives. The focus ought to be on the implications for domestic consumption of fish of current structural and sectoral adjustment initiatives. This would entail a careful analysis of any changes which might have taken place since 1989 in the end uses of the artisanal catch and in the relative prices of fish for export versus that for local consumption. It would also necessitate a careful look at whether there have been any shifts in the species compositions of the artisanal catch either in response to export demand or as a result of favoured species for local consumption being diverted to the export market.

The second possible area for further research is that of the distribution of income within the sector broadly defined. It would be extremely useful for policy makers to know with more precision who is benefitting from improved incomes. In the artisanal sector this would mean knowing more about where additional fishers are coming from and why, who owns boats and gear, who uses them and on what terms. Tracing family linkages and incremental value added from fisher to processor, to various types of traders and transporters would also be helpful. We need to know the extent of use of the unofficial credit market and the cost of credit. As the links between the artisanal sector and the industrial sector grow it would be helpful to have more information on purchase prices, mark-ups and any changes in ownership relations between the two sectors. As the resource constraint is reached, there could be far-ranging implications on industrial structure and income distribution but current data sources would not reveal these accurately.

The third possible area for further study would be to examine the impact of structural adjustment on fishing communities as total communities. This would mean situating fishers, processors, traders, suppliers, etc. within their community and assessing how policy changes had affected them relative to other members of the community. How has the relative attractiveness of fishing changed and with what implications for the industry, other sectors and the community as a whole? How have government cut-backs affected services, health and education services, etc. on the ground? What has happened to poverty, to the gender division of labour, to the cohesion of the community, to locally provided and financial services? These are all inter related issues which require longer term research at the community level; they go beyond the narrow focus on fish and fishers but are crucial to the well-being of the fishing community.

There are many other issues which could be examined but these seem to be the key ones, subject to their not being addressed by the ongoing studies mentioned.

The second and third areas would require primary data collection including the interviewing of families. While government agencies are likely to welcome and support this, they are unlikely to have the financial and material resources to undertake the work. This would be an ideal area for input by aid donors and external research organizations working co-operatively with local academics and consultants. Since the latter are somewhat in short supply and in great demand primary responsibility would have to rest with the external agency.

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VI CASE STUDY: CHILE

Chile is unique among the three countries selected for study in this project because the economic policies implemented by the military junta, which seized power in September 1973, are similar to the orthodox monetary and fiscal policies recommended by the International Monetary Fund and the World Bank. The Pinochet Government's economic measures included currency devaluation, reduction of tariffs, lifting of price controls, tightened availability of credit, reduction of public sector spending, and privatization of state enterprises. Chile has therefore been undergoing structural adjustment for almost 20 years and provides an opportunity to analyze the long term effects on the fisheries sector.

1. THE ECONOMY BEFORE 1973

During the period of 1930 to the late 1950s Chile attempted to reduce its dependency on copper exports by pursuing an import substitution development strategy. Policy measures to encourage domestic self-sufficiency included: erecting high tariff barriers; setting prices for both goods and factors of production; providing tax incentives for producers of substitute goods; and direct government involvement in production and distribution activities as well as in the allocation of credit and foreign exchange. These programs involved large public expenditures which were financed by inflation and foreign debt. As a result, the country carried a heavy foreign debt burden while growth in GDP was slow and there were frequent balance of payment problems [World Bank, 1979, p.1-2].

The Alessandri Government (1958-1964) tried an alternative strategy and initially liberalized international trade. Foreign debt and imports continued to rise, however, and the Government later responded by reversing these policies. The Frei Government (1965-1970) focused on providing a more equitable distribution of income. It undertook agrarian reform, increased income taxes, adjusted wages to inflation, reduced import restrictions, established a crawling peg exchange rate, and increased public investment in housing and education. These policies were successful in reducing inflation and both the fiscal and balance of payments deficits. There was also some improvement in the distribution of income. Savings did not increase however, and investment was therefore financed by foreign debt [World Bank, 1990, p. 3].

The Allende Government (1970-1973) believed that Chile's economic problems (economic stagnation, income maldistribution, inflation, low employment) were the result of the concentration of ownership of land and other assets. Their policies attempted to correct this concentration by extending the agrarian reforms of the Frei Government and the nationalization of many sectors of the economy [World Bank, 1979, p. 61]. This involved large increases in government spending financed by monetary expansion which eventually led to inflation despite the establishment of price controls. Interest rates were held at negative real levels with the result that credit had to be rationed and capital markets were destroyed. International trade was also highly regulated by quantitative import and export restrictions, multiple exchange rates, and differential tariffs (some as high as 750%) [World Bank, 1990, p. 4].

In the first year these programs were successful in increasing economic growth, reducing unemployment, slowing inflation, and improving real wages and income distribution. In the next two years, however, with internal and external political destabilization, real GDP decreased, inflation rose, there was a balance of payments crisis, and the public sector deficit was high.

2. STRUCTURAL ADJUSTMENT MEASURES AND THE MACROECONOMIC IMPACTS

2.1. Summary of Structural Adjustment Policies

The military junta headed by General Pinochet seized power in September 1973. Its immediate concern was to reverse the trends set in motion by the previous government [Foxley, 1983 p. 95]. Within the first few months of taking office, the new government:

- removed price controls;
- devalued the local currency and re-instituted a crawling peg;
- initiated the process of returning socialized enterprises to private sector;
- increased taxes; and
- stopped land expropriations.

In mid-1974 the world price of copper began to decline and international lenders began to withhold support. Foreign exchange earnings dropped, but payments to foreign creditors continued, causing the Chilean economy to sink into its worse depression since the 1930s.

The Pinochet Government's response to the recession was its "Economic Recovery Program" implemented in April 1975. The basic policies underlying this program were trade liberalization, increasing the role of the market in the allocation of resources, and reducing the fiscal deficit to prevent the need for monetary expansion and the inflation that was believed to accompany it. The main details of the program were the:

- continued devaluation of the peso;
- phased reduction of tariffs from as high as 220% for some goods to a universal 10%;
- elimination of non-tariff barriers to trade;
- continued privatization of public sector enterprises;
- freeing of interest rates;
- banning of unions and making mandatory wage indexation;
- increase in tax revenues through higher income and property taxes, a 20% VAT and tougher tax administration;
- reduction of government spending by staff cuts and by making public enterprises self-financing through user charges and cost-cutting measures.

The exchange rate was fixed at 39 pesos per $US1.00 in June 1979 and maintained until mid-1982. Because of the high rate of inflation in Chile relative to the United States and its other main trading partners, this policy led to a significant appreciation of the real exchange rate [Foxley, 1983 p. 60]. Also at this time, the government liberalized international capital flows, making borrowing abroad very easy. The effect was an increase in both imports and foreign debt.

In 1982, a number of external factors (including high oil prices, low copper prices, increasing real interest rates, the world debt crisis and a world-wide recession), combined with the increased foreign debt of the country (69% of GDP by the end of 1982) to cause a reduction of capital inflows. The end result was the severe recession of 1982 and 1983.

An IMF-supported stabilization program was adopted to deal with the crisis and to appease Chile's creditors. The program involved:

- rescheduling of all debt due in 1982/83
- new bank credits of $1.3 billion
- fiscal austerity
- credit curtailment
- an increase in tariffs to 35 percent

Because these measures had only a minimal effect, a new plan was developed in 1984, this time with the support of both the IMF and the World Bank. Its objectives were to diversify exports, reduce foreign debt, increase savings and investment, and strengthen the financial system [World Bank, 1990, p. 10]. The main components of the plan included the following measures:

- currency devaluation;
- export promotion through PROCHILE (a branch of the Foreign Affairs Ministry devoted to promoting Chilean products abroad);
- reopening the economy through tariff reductions;
- a program to encourage nontraditional exports that included a temporary admission system for export producers, more prompt refund of the VAT to exporters, and the refund of indirect taxes to small exporters;
- reduction of government deficit through increased taxes and reduced expenditures, and an increase in public sector savings; and
- continue downward pressure on wages.

In addition to these, which were basically a continuation of the structural adjustment policies of the 1970s, the new plan addressed the long term problem of economic vulnerability to the world price of copper by proposing the establishment of the "Copper Stabilization Fund."

Subsequent phases of the adjustment program included strengthening of social programs, accelerated reprivatization of the financial sector, further public sector savings, improved efficiency of the public sector's investment program and debt reduction via a program of debt restructuring and conversion.

This plan was supported by three "Structural Adjustment Loans":

SAL I (Oct. 1985)
- $1 billion - World Bank Emergency Financing Facility
- SDR 750 million - Loan
- $1.1 billion new lending from private banks

Conditions emphasised balance of payment corrections, increased exports, economic and employment growth.

SAL II (Nov. 1985)
- $250 million to reinforce SAL I.

Conditions emphasised export diversification, savings mobilization, and better targeting of social policies.

SAL III (Dec. 1985)
- $250 million.

Conditions similar to SAL II.

2.2. Macroeconomic Effects of Structural Adjustment Policies

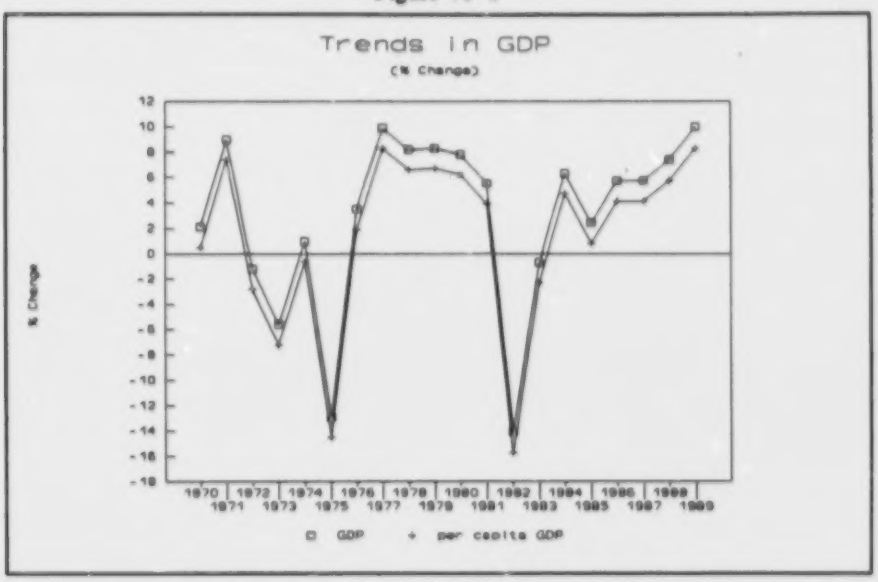
The first series of reforms led to a number of changes in the structure of Chile's economy in the mid to late 1970s. The most significant of these were the increased role the private sector began to play in the economy, especially in the financial sector, and the complete elimination of the power of labour. As a result of these and other changes, the following impacts were observed between 1975 and 1978:

- real wages and salaries declined, probably leading to a worsening of the distribution of income;
- unemployment rose to unprecedented levels in 1975 which did not improve by the end of the decade;
- the fiscal deficit was reduced due to decreased government expenditures and increased taxes;
- inflation remained high, but decelerated significantly in 1976 - 1978 due to rising unemployment, lower real wages, and reduced government deficit;
- exports were increased and diversified; and
- after 1975, GDP and GDP per capita increased (Figure VI 1).

In 1979, the exchange rate was frozen and the flow of international capital was liberalized. These two policies played an important role in increasing imports and foreign debt.

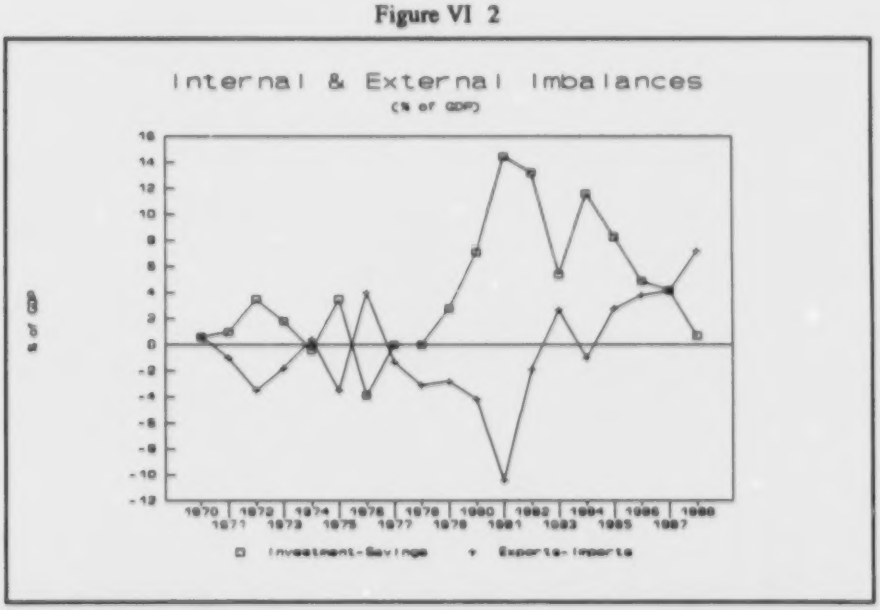
The recession of 1982/83 had the effect of reversing the positive and reinforcing the negative trends brought about by the policies of the mid-1970s. GDP, real wages and imports dropped significantly, unemployment increased to levels exceeding even those of the 1975 recession, many companies went bankrupt, and the foreign debt service burden became onerous.

Figure VI 1



Source: Table VI 1

Figure VI 2



Source: Table VI 1

Following the structural adjustment measures implemented in 1985, the Chilean economy went through another period of adjustment including a second wave of privatization of public enterprises, an increase of both copper and "non-traditional" exports, and an increase in production and employment in the manufacturing sector. During the same period, Chile was favourably affected by an increase in the world price of copper, which still accounts for about half of the total exports, and a reduction in world oil prices. The result was a 54 percent improvement in Chile's terms of trade in 1988. The combined impacts of structural adjustment and favourable external climate were

generally positive: real GDP increased, unemployment was reduced, inflation was slowed, savings and investment increased, and both the balance of payments and the government deficits were reduced (see Figures VI 1 and VI 2).

Despite these positive trends, real wages and salaries did not show any significant improvement between 1985 and 1988. The gains that were made in 1988 and 1989 were diminished to some extent by the return of high inflation in 1989. In addition, the maldistribution of income, a long-standing problem in Chile, appears to have been exacerbated by the structural adjustment measures of the 1980s. The total income share of the wealthiest 10 percent of the population increased from 48.5 to 56.6 percent [Ritter, 1990, Table 10].

3. THE FISHERIES SECTOR

In 1990, Chile was the world's sixth largest producer of fish and the second largest producer and exporter of fishmeal. The country has more than 4,200 km of coastline and a productive fisheries resource fed by the nutrient-rich cold water upwelling of the Humboldt Current. Sardine, anchovy and jack mackerel together make up approximately 85 percent of Chile's total landings and are almost entirely processed into fishmeal.

Because of the limited domestic market for fishmeal, and the lack of alternative uses for sardine, anchovy and jack mackerel (given current technology and markets), most of the fish caught in Chile is exported. Of the roughly 15 percent of the total harvest that is for direct human consumption, only about five percent remains in Chile. This is partially due to Chile's small population (about 12 million) and an unusually low per capita fish consumption of about five kilograms per year.

Fishmeal and fish oil (a by-product of fishmeal) together account for 82 percent of the total volume of fishery products exported, but because of their low values, represent only 43 percent of the total foreign exchange earned by the sector. Exports of fresh, frozen and canned fish and shellfish make up about 50 percent of the total value of fisheries exports. Exports of seaweed, seaweed products and other fish products make up the remaining seven percent. The total value of fishery product exports was US$ 914.7 million in 1990, or about 12 percent of Chile's total exports.

The sector is an important source of employment, providing jobs for almost 108,000 people. Sixty-nine percent of these people are directly involved in fish harvesting activities. There are about 58,000 artisanal fishermen, and about 14,000 working on the industrial fishing fleets. While there are virtually no women working on boats, they do make up a significant portion of the 28,000 estimated to be employed in the industrial processing subsector. There are also an unknown number of women employed in the processing and marketing of the artisanal harvest that serves the domestic market, and in the baiting and cleaning of the long-line hooks used by many artisanal fishermen. An additional 8,000 people are involved in the industrial aquaculture.

In 1989, the landed value of the fish harvest was about US$ 240 million, or roughly 0.94 percent of GDP, but because of a drop in landings in 1990, the sector's contribution to GDP declined to 0.8 percent. These calculations do not include the value-added by processing and marketing of fish which are estimated to increase the value of the sector's production by up to five times [Capurro, 1991, p.8].

Table VI 1 CHILE: MAIN ECONOMIC INDICATORS

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Activity & Trade																				
% Change in --																				
Real GDP(1)	2.1	9.0	-1.2	-5.6	1.0	-12.9	3.5	9.9	8.2	8.3	7.8	5.5	-14.1	-0.7	6.3	2.4	5.7	5.7	7.4	10.0
Real GDP/Capita(1)	0.5	7.4	-2.8	-7.2	-0.6	-14.5	1.9	8.3	6.6	6.7	6.2	3.9	-15.7	-2.3	4.7	0.8	4.1	4.1	5.7	8.3
Unemployment Rate (2)	3.5	3.3	3.3	4.8	9.1	16.9	17.9	17.4	18.4	17.4	15.6	16.0	16.1	27.4	22.3	20.1	13.9	10.3	6.7	5.6
Volume of																				
Exports/Imports (3)	--	--	--	--	--	--	--	--	--	1.0	1.0	0.8	1.4	1.5	1.5	1.9	2.1	1.8	1.8	--
Terms of Trade																				
(1980=100) (4)	237.1	185.8	174.1	221.1	155.0	107.1	106.9	100.1	94.0	109.1	100.0	85.8	78.7	84.7	79.5	79.4	77.8	83.9	102.1	107.0
Wages & Prices																				
% Change --																				
in Real Wages (5)	13.4	27.3	1.3	-6.4	-23.6	3.4	8.7	29.3	15.3	--	8.7	8.9	-0.3	-10.7	0.1	-4.3	2.1	-0.1	6.5	--
in CPI(6)	34.9	22.1	163.4	508.1	375.9	340.8	174.2	63.5	30.3	33.4	35.1	19.7	9.9	27.3	19.9	30.7	19.5	19.9	14.7	--
Money & Credit (levels)																				
Public Credit % of GDP (7)	--	--	--	--	--	--	21.1	--	10.8	6.1	-0.5	-2.6	3.1	10.2	23.4	--	--	--	--	--
Private Credit % of GDP (7)	--	--	--	--	--	--	15.6	--	26.5	31.9	42.1	50.5	82.4	71.9	75.4	--	--	--	--	--
Money Supply % of GDP (8)	10.3	16.7	22.6	23.1	8.6	7.0	5.8	5.7	8.8	--	--	--	31.0	24.7	26.5	27.3	28.8	31.6	31.3	--
Interest Rate (4)	--	--	--	--	--	267.4	197.9	93.7	62.8	45.1	37.4	40.8	47.8	27.9	26.1	31.6	18.9	25.1	14.9	27.5
Imbalances (levels)																				
Internal Imbalance % GDP (9)	0.6	1.0	3.5	1.8	-0.4	3.5	-3.9	--	--	2.8	7.1	14.5	13.2	5.4	11.6	8.3	4.9	4.2	0.7	--
External Imbalance % GDP (10)	0.7	-1.0	-3.5	-1.8	0.4	-3.5	4.0	-1.3	-3.1	-2.8	-4.2	-10.4	-1.9	2.7	-1.0	2.8	3.8	4.1	7.2	--
Government Deficit % GDP (4)	2.7	10.7	14.0	24.7	10.5	2.6	2.3	1.8	0.8	-1.7	-3.1	-1.7	2.3	3.8	4.0	6.3	2.8	0.1	1.7	0.4
Exchange Rate & Debt																				
% Change in --																				
Exchange Rate (11)	--	33.3	56.3	1340.0	419.4	354.5	104.7	60.9	21.4	14.7	0.0	0.0	88.2	19.2	46.5	43.4	11.3	16.3	3.8	23.7
Real Exchange Rate (12)	--	12.8	38.7	46.3	-75.6	-22.0	11.0	8.9	-16.5	1.0	16.1	18.0	-9.6	-18.6	-1.8	-19.4	-9.1	-3.5	-6.0	3.5
Total Debt Stocks (13)	--	--	--	--	--	--	--	--	--	--	12.1	--	17.3	17.9	19.7	20.4	21.1	21.5	19.6	18.2
Public & Publicly																				
Guaranteed (13)	2.1	--	--	--	--	--	--	--	--	--	4.7	--	5.2	6.6	10.6	12.9	14.7	15.6	13.7	10.9
Debt Service Burden (14)	--	--	--	--	--	--	--	--	--	--	43.1	--	71.3	54.5	59.9	48.6	41.5	36.5	25.2	27.5

Sources:

(1) Central Bank of Chile (Base=1977)

(2) Central Bank of Chile (includes those employed in the Government employment programs)

(3) Quantum Index (1980=100), Source: World Bank, 1990

(4) Central Bank of Chile

(5) 1970-1978 calculated as the percent change between April of current year and April of previous year. Source: World Bank, 1979. 1979-1988 Source: Instituto Nacional de Estadisticas.

(6) 1970-1978, Dec. - Dec. % change in offical CPI, Source: World Bank, 1979, p. 544. 1979-1988: Central Bank of Chile.

(7) International Financial Statistics Yearbook, 1990.

(8) 1970-78 from World Bank, 1979; 1982-1988 from World Bank, 1990.

(9) Investment minus Savings. Sources: 1970-76: World Bank, 1979; 1979-89: World Bank, 1990.

(10) Exports minus Imports. Sources: 1970-78: World Bank, 1979; 1977-88: World Bank, 1990.

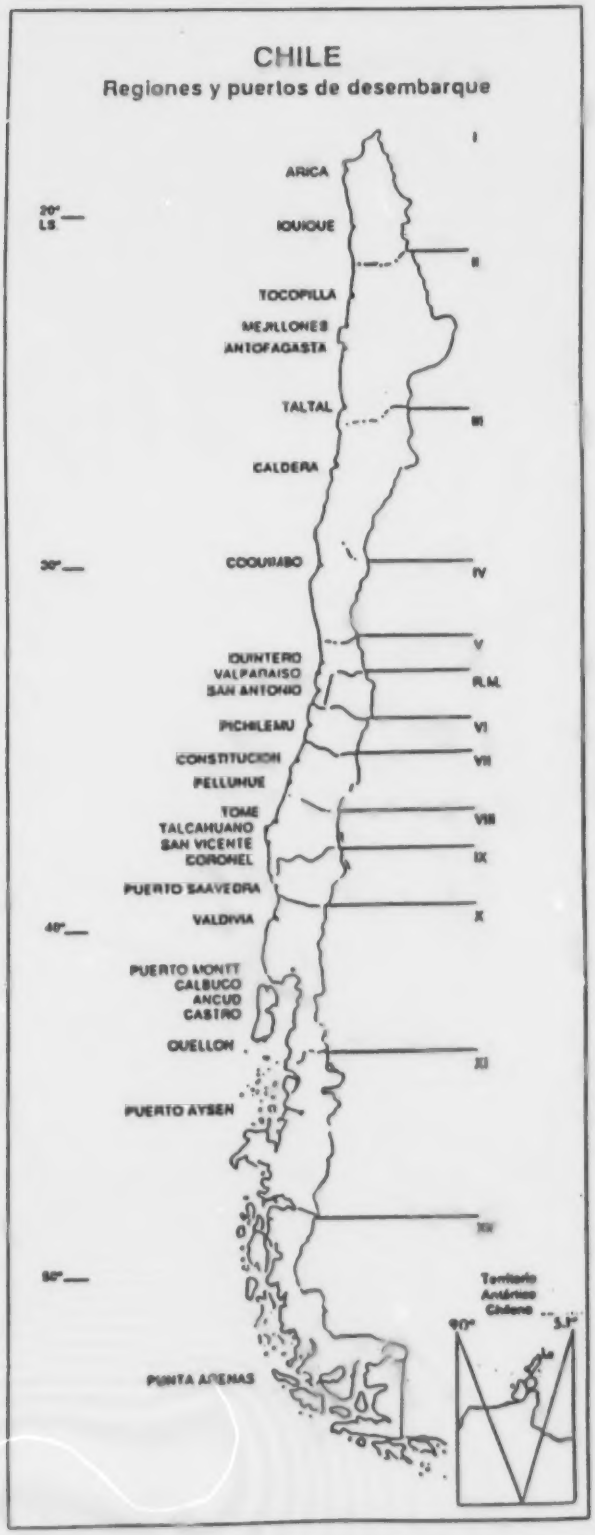
(11) pesos per US $, Source: Central Bank of Chile

(12) pesos per US $ (1980=100), Source: Central Bank of Chile

(13) billions of US$, Source: International Debt Tables

(14) (Total Debt Service)/(Exports of Goods and Services), Source: Central Bank of Chile

Figure VI 3



Source:
SERNAP,
1990, p. 9

3.1 Structure of the Fishing Industry

3.1.1 Industrial and Artisanal Fisheries

Chile's fishing industry is divided into the industrial and the artisanal subsectors based on fishing vessel size. The legal definition states that to be classified as artisanal, fishermen must own or work on a boat that is less than 18 meters in length and has a capacity of less than 50 gross tonnes (GT). Because of the advantages of being classified as artisanal (eg. no income taxes, access to all coastal waters, and limited restrictions on vessel operations), there are many boats that fall just under the maximum size restrictions and utilize modern fish capture technology such as sonars, radios, and mechanical gear hauling equipment. However, the majority of artisan fishermen in Chile use small open boats of about six to eight meters in length and their equipment is limited to outboard motors and either fishing nets or long lines (Table VI 2).

The industrial fleet is comprised primarily of purse seiners with an average capacity of 318 GT. The remaining industrial fleet includes trawlers, long liners and factory ships. The capacity of these vessels range from an average of 200 GT for a long liner, to an average of 2,176 GT for a factory trawler.[1]

Seventy percent of the 58,000 artisanal fishermen live in rural fishing villages called caletas located all along the Chilean coast. Geographically, the coastline is divided into 12 administrative regions (see Figure VI 3). Forty percent of the artisanal fishermen are found in the Xth Region and another 20 percent are in the VIIIth Region (Figure VI 4).

Because of the far greater fishing efficiency of the capital intensive industrial fleet, the artisanal sector is responsible for only about eight percent of the total volume of fish landed in Chile. The artisanal harvest is made up of 68 percent fish, 24 percent mollusks, two percent crustaceans, and five percent other species, and is almost entirely used for human consumption. Because of the much higher value of fish and shellfish used for human consumption, the artisanal fishermen receive 40 percent of the total landed value.

Table VI 2 Industrial and Artisanal Fishing Fleets, 1989

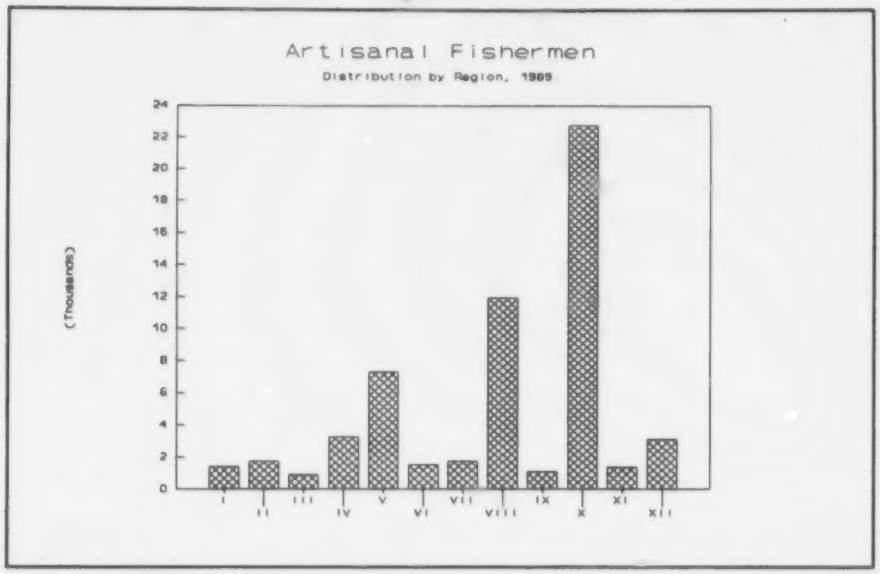
	Number
Industrial Fleet:	
Purse Seiners	349
Trawlers	62
Factory Trawlers	12
Long Liners	19
Factory Long Liners	17
Total Industrial Fleet	459
Artisanal Fleet:	
Lancha[1]	2,437
Inboards	1,743
Small motor boats	5,394
Small sail boats	4,414
Others	1,211
Total Artisanal Fleet	15,199

[1] Large boats, generally 15-18 m. in length, approaching 50 GT, and equipped with modern equipment.

Source: IFOP, 1989.

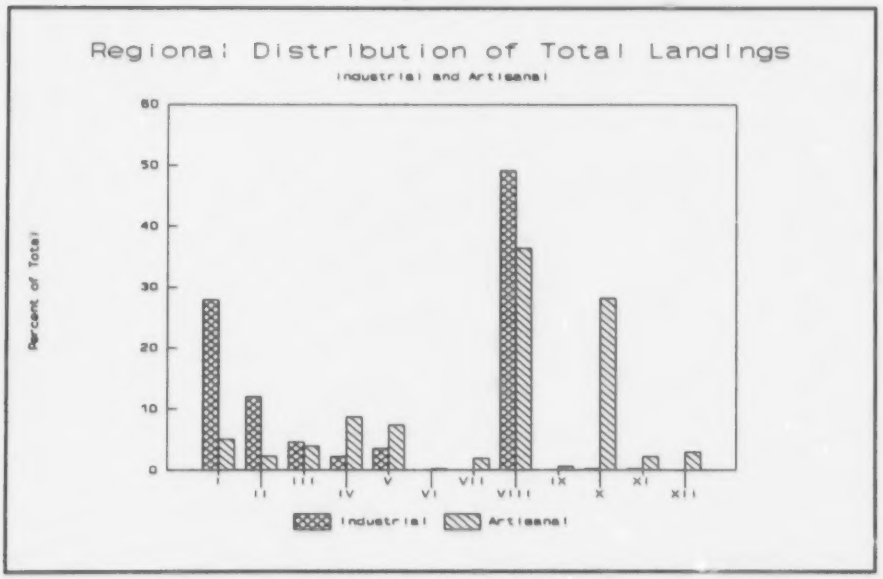
[1] Averages calculated from IFOP data for 1989.

Figure VI 4



Source:
Annex VI 2,
Table A.

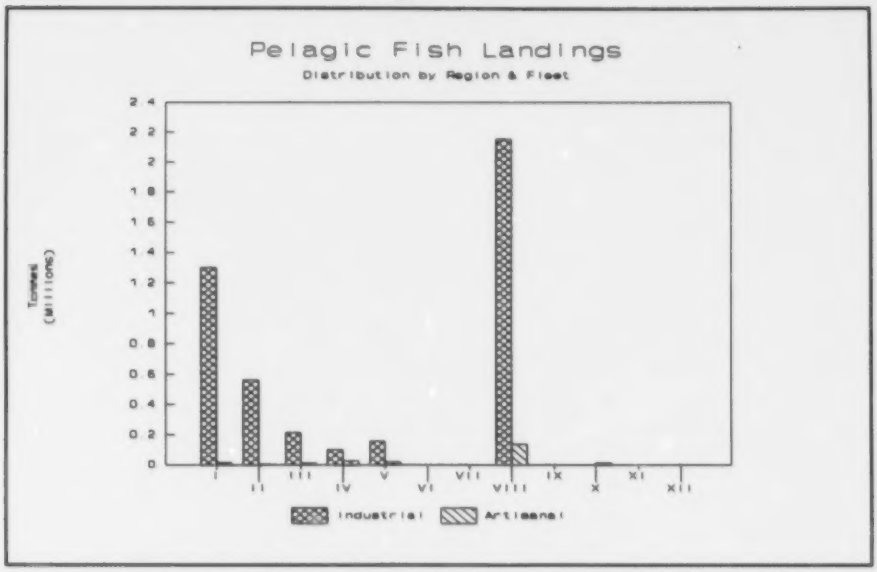
Figure VI 5



Source:
Annex VI 2,
Table B.

The geographical distribution of the harvests of the artisanal and the industrial fleets are shown in Figure VI 5. Although the VIIIth Region is currently the most important fishing area for both fleets, the Xth Region is clearly the second most important for the artisanal fishermen, while the remaining industrial harvest is concentrated in the northern regions.

Figure VI 6



Source:
Annex VI 2
Table B.

The distribution of the harvest relates to the availability of the species exploited by the two sub-sectors. The fish resources of Chile can be classified into 3 main groups: pelagic species, demersal species and mulluscs. Pelagic fishes are dark-fleshed and are generally found in large schools within 100 meters from the surface of the ocean and 120 miles from shore. The three most important pelagic species are anchovy, sardine and jack mackerel, which make up about 86 percent of the industrial harvest. Historically the largest stocks of these fish were found in the northern regions. In 1990 however, landings in the north dropped dramatically, and Region VIII now dominates in pelagic harvests. The current situation is illustrated in Figure VI 6, which shows how the harvests of anchovy, sardine, jack mackerel, pacific mackerel and pacific herring are geographically distributed. Figure VI 6 also shows the insignificance of the artisanal subsector in the pelagic fishing industry.

In the past, fishmeal plants have also been concentrated in the north, but through the 1980s the industry expanded, and now plants are found as far south as the VIIIth Region. With the recent shift in harvesting activities, this trend is likely to continue. The industry is characterized by vertical integration and a highly concentrated level of ownership. It has been estimated, for example, that one man who has also made significant investments in other sectors, owns 70 percent of the industry in the north, and 20 percent in the south [Jose Raúl Cañon, pers. comm.].

An estimated 10,000 workers are employed by the pelagic industry to operate and maintain its fleet of 349 purse seiners. Within its processing plants, many of which also produce canned products, an additional 5,000 workers are employed [Capurro, 1991, p. 13].

Demersal species are white-fleshed finfish and crustaceans which live close to the ocean floor along the continental shelf (a strip along the coastline about 10 miles wide). Among the economically important demersal species are several types of hake, sea bass, and a number of species of shrimps and crabs.

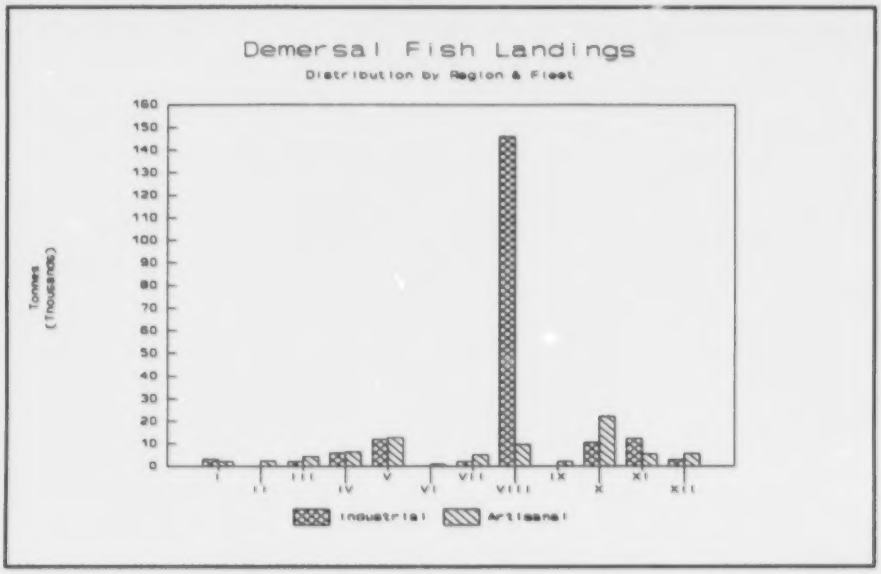
Figure VI 7 shows how the demersal harvests of the industrial and artisanal sub-sectors are geographically distributed. The industrial harvest is concentrated in the VIIIth Region while the largest portion of the artisanal catch comes from the Xth Region, followed by the Vth and then the VIIIth Regions.

The industrial sector of the demersal industry concentrates on the export market and, like the fishmeal industry, is characterized by vertical integration and a concentration of ownership. Many of the largest artisanal boats also provide fish for the export market. The ownership of these boats vary. Some are owned by the processing plants,

while others are owned by fishermen, but were purchased with credit provided by the processing plants. The remainder are owned by fishermen who were able to secure their own credit or were assisted by one of two credit program financed by the Inter-American Development Bank (IDB).

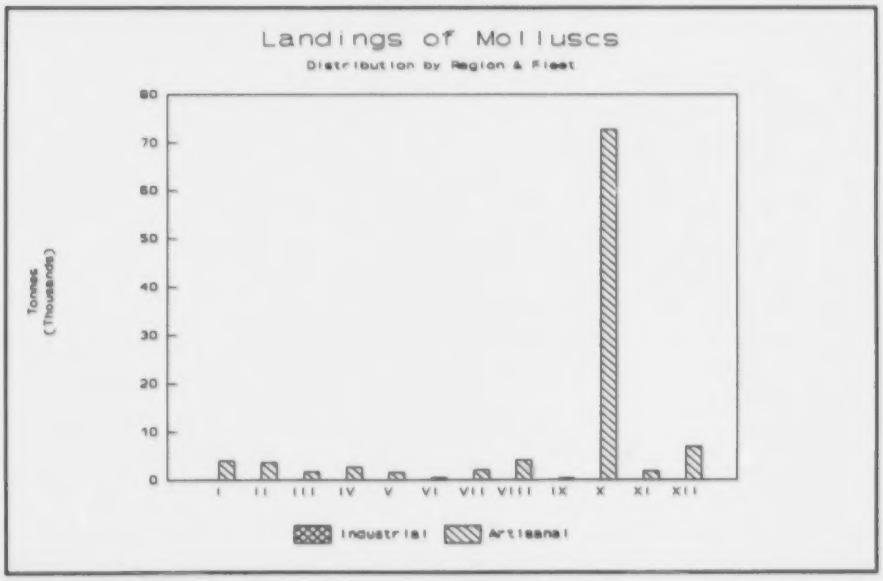
In total, about 90 percent of the demersal harvest is exported. The remaining harvest serves the domestic market and is caught largely by the small boat operators within the artisanal subsector.

Figure VI 7



Source: Annex VI 2 Table B.

Figure VI 8



Source: Annex VI 2 Table B.

Factory vessels (mostly from Japan, Korea and Spain) have been operating in Chilean waters for more than a decade with demersal landings ranging between 50,000 and 70,000 tonnes per year. To gain access to the fisheries resource, the owners of these vessels must form a "joint venture" with a local partner. Within this arrangement they carry and display the Chilean flag which enables them to navigate and fish within Chilean waters. They are expected to pay taxes based on their profits and abide by Chile's regulations concerning access, catch reports and crew composition. However, there has been considerable under-reporting of catch and sales. Coupled with the use of accelerated depreciation techniques and on-board transfers of catch, these practises have allowed this foreign-owned fleet to pay only minimal taxes to the Chilean Government.

Mulluscs such as clams, mussels, snails, oysters and scallops live on the ocean floor and are valued species that are harvested exclusively by artisanal fishermen, most intensively in the Xth Region (Figure VI 8). Some is sold in the domestic markets, but most is purchased by processing plants located in the south and is canned or frozen and exported. These plants also process and export the demersal species harvested in the region.

3.1.2 Seaweed Harvesting

Seaweed, which is both gathered and cultivated by the artisanal subsector, has become an important fisheries product in the last ten years with a total production of over 200,000 tonnes in 1990. The seaweed is processed into agar-agar which is used as a thickening agent in food, cosmetics and pharmaceuticals.

Chile's seaweed production is either dried and exported or processed domestically and then exported. In 1990, the exports of seaweed and agar-agar had a total value of US$ 50 million, or about five percent of the total value of all fish products exports. The main market was Japan, but Europe is also important.

Currently, there are about 12,000 men and women engaged in seaweed harvesting or cultivation, and over half are located in the Xth Region. Another 30 percent are located in the VIIIth Region, and the remaining 20 percent are distributed in the north and central regions.

As the natural abundance of commercially important species of seaweed is reduced due to harvesting, culturing is becoming a more important means of production. Fishermen are also turning to seaweed cultivation as a source of income as the resource depletion makes it increasingly expensive to fish.

Seaweed cultivation and harvesting has provided annual incomes of approximately US$ 5000 per year in the past, but current incomes are less than half that due to a recent drop in world prices [Fernando Berroeta, pers. comm.]. This has led to an increased awareness among fishermen's groups of the need to diversify their production, and there is now more interest in the small-scale cultivation of oysters, mussels and scallops.

3.1.3 Aquaculture

Salmon is the most important species in Chile's aquaculture industry, but trout, turbot, sturgeon and several types of clams are also raised. Total salmon production in 1990 was 23,313 tonnes, up 160 percent from the previous year's production [SERNAP, 1990].

In 1988 there were 72 companies involved in salmon farming, but the industry is dominated by four large foreign-owned companies, which together account for 50 percent of the total production [Price Waterhouse, 1991, p. 78]. These and some of the other large foreign-owned companies are vertically integrated and own hatcheries and feed mills. The smaller operations are generally owned domestically and, likely due to a lack of capital, have not vertically integrated their operations [Ibid, p.80].

Salmon aquaculture is concentrated in the Xth Region, especially in Puerto Montt and on the island of Chiloe. The conditions in the southern regions are well suited to aquaculture because the many small islands and inlets provide protection from severe weather, while the strong tides and lack of industrialization in the area contribute to a high level of water quality. The disadvantages of operating in this part of Chile are its remote location and poor transportation infrastructure.

As with other fish produced in Chile, most of the salmon production is exported. In 1989, 90 percent of Chile's salmon exports were destined for Japan or the U.S. The majority was sold whole and either fresh or frozen, which has proven to be the most profitable.

3.2 Fisheries Management, Research, and Industry Organizations

3.2.1 The New Fishing Law

Chile has attempted protect its fisheries resources by implementing a number of regulations aimed at restricting fishing effort and access. These have included minimum mesh size, maximum vessel size, and maximum number of hooks. Other restrictions, such as closed fishing seasons, total annual quotas, minimum size limits, and bans on catching females carrying eggs, limit the catch.

A new fisheries law was recently approved by the Senate of Chile that is intended to better protect the fisheries resource. The idea of a new fisheries law was first introduced in 1985, but the pelagic fishing industry was able to successfully lobby against it for six years. They see the new law as a threat to their historic rights of free access that will ultimately result in their loss of resource rents.

Under the new fisheries law, artisanal fishermen will be given exclusive access to all inshore waters within five miles of the shore. The industrial fisheries will be subject to three different access regimes that depend on the level of stock exploitation. Over-exploited fisheries will be closed and access to under-exploited fisheries will not be limited. Those stocks designated as fully-exploited fisheries will be subject to the following limited access regime. A total allowable catch (TAC) will be established and five percent per year of the TAC will be allocated through a bidding system for individual transferable quotas (ITQs). This process will carry on for up to 10 years, so that eventually 50 percent of the TAC will be allocated.

3.2.2 Government, Fisheries Research and Industry Organizations

Chile has three government agencies directly involved in fisheries management and research. The main regulatory agency is the Undersecretary of Fisheries within the Ministry of the Economy (SUBSE). Its responsibility is to establish policy and fishing regulations. The National Fisheries Service (SERNAP) enforces the regulations, monitors the industry's harvest and fishing effort, and collects, maintains and publishes annual fishery statistics. The government's research is carried out by the National Fisheries Development Agency (IFOP). IFOP was designed to be an independent research body, but in reality many of its projects are carried out on the request of the Undersecretary of Fisheries.

PROChile is the branch of the Ministry of Foreign Affairs responsible for promoting Chilean exports. The agency's activities in the fisheries sector include: negotiating bilateral agreements with importing countries; establishing and promoting consistent quality control measures for individual products; contacting and bringing potential buyers to Chile; organizing tours for fish producers to international trade shows; running promotional campaigns; and collecting and disseminating international market information.

Universities play an important role in fisheries research and, to some extent, in shaping fisheries management. For example, the Fisheries School of the Catholic University of Valparaiso has successfully organized workshops that have brought together industry, government and academics to share information and discuss fisheries management issues. Academic institutions have also been successful in securing foreign funds for research and development projects. One example is an artisanal fisheries development project currently being conducted by the Department of Marine Science of the Catholic University in Concepcion with funding from IDRC. This project involves both the development of mussel culture technology and transfer of this technology to the people of small rural fishing communities.

So while there is no government fisheries extension services, this void is at least partially filled by universities. Also important in this area is a non-profit organization called FUNCAP which operates a fisheries training centre in Coronel (near Concepcion). FUNCAP has received most of its technical advice and training materials (including

a pilot processing plant and three fishing boats), from a Japanese funding agency (JICA). Operating expenses are covered by sales of its fish production, and funding from the Chilean and foreign governments.

One of the main industry organizations is the Fishmeal Exporters Association (CORPESCA). In addition to carrying out market and technological research, CORPESCA also conducts its own biological research. The results of this research is often very different from the conclusions made by academic or government research and is used to support the industry's lobbying efforts.

The National Confederation of Artisanal Fishermen of Chile (CONAPACH) is the main organization in the artisanal subsector. Its membership is made up of the leaders of regional Fishermen's Federations, which in turn are made up of the leaders of the smaller fishermen's unions. The organization of CONAPACH began in 1985 and it now represents about 20,000 fishermen or one-third of all artisanal fishermen. The low representation reflects the fact that the federations of the southern regions, where 40 percent of the country's artisanal fishermen are located, have not yet joined.

CONAPACH is working towards improving the prices paid to fishermen, promoting sustainable fisheries development, and developing leadership within the fishing communities to promote community independence and development.

3.3. Development of the Fisheries Sector

Chile's fishing industry has expanded rapidly since the end of the Second World War, when annual harvest levels were under 50,000 tonnes, to the current harvest levels of about 6 million tonnes. In the 1960s fish made up two percent of the country's total exports and employed about two percent of the labour force [Shapiro, 1965, p.1]. Today two percent of the labour force is still employed in fisheries, but exports from the sector now make up 12 percent of the total. The sector's growth is related to two main factors: the country's rich fisheries resource, and a series of supportive government programs. This section looks at the development of the fishing industry in the context of both these factors.

3.3.1 Development of the Pelagic Fisheries

Prior to the 1960s, Chile did not have a northern pelagic industry. Only after the collapse of the nitrate industry, which had been concentrated in the north, did the government begin a program to develop the pelagic fishery and establish a fishmeal industry.

The government invested a total of US$ 30 million in the pelagic processing industry and encouraged exports by offering a 20 to 30 percent bonus on the value of exports to fishmeal plants in northern Chile. Development was also encouraged by allowing the industry to import fishing vessels, gear and manufacturing equipment tariff-free [Shapiro, 1965, p.1]. In addition, fisheries were exempt from most transfer taxes, were given preferential port charges, and were forgiven 90 percent of the tax on real property and that part of their income distributed to their workers, if firms pledged to reinvest at least 15 percent of their profits back into the fishery sector. These benefits were originally set to expire in 1973, but most were extended to 1978 by the Pinochet Government [World Bank, 1979, p.202].

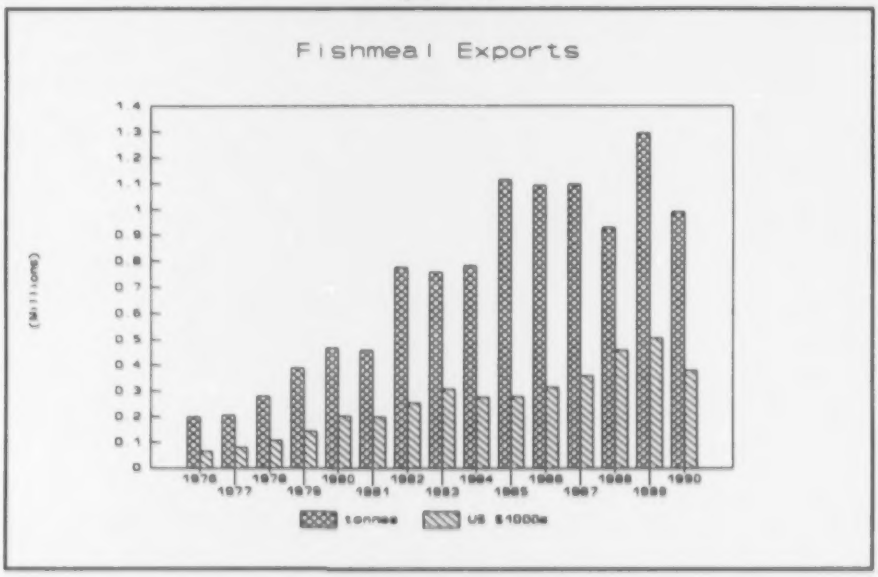
The government also invested in fish harvesting and boat building. Fishermen were given liberal loans for modernizing boats and equipment [Shapiro, 1965, p.14]. Also with government assistance, Chile began to build its own purse seiners in the 1960s.

The export promotion programs were successful, helping fishmeal exports to increase from about 5,000 tonnes in 1950 to 88,500 by 1963. Even after the government incentives for the industry expired, it continued to grow. Exports surpassed one million tonnes in 1985, and peaked at almost 1.3 million tonnes in 1989. The value of fishmeal exports also peaked in 1989 at US$ 507.0 million, but dropped 25 percent in 1990 (Figure VI 9).

Clearly, growth of this magnitude could not have been possible without Chile's enormous resource base, but the sustainability of the current production levels is uncertain. Initially, the fishmeal industry exploited the anchovy

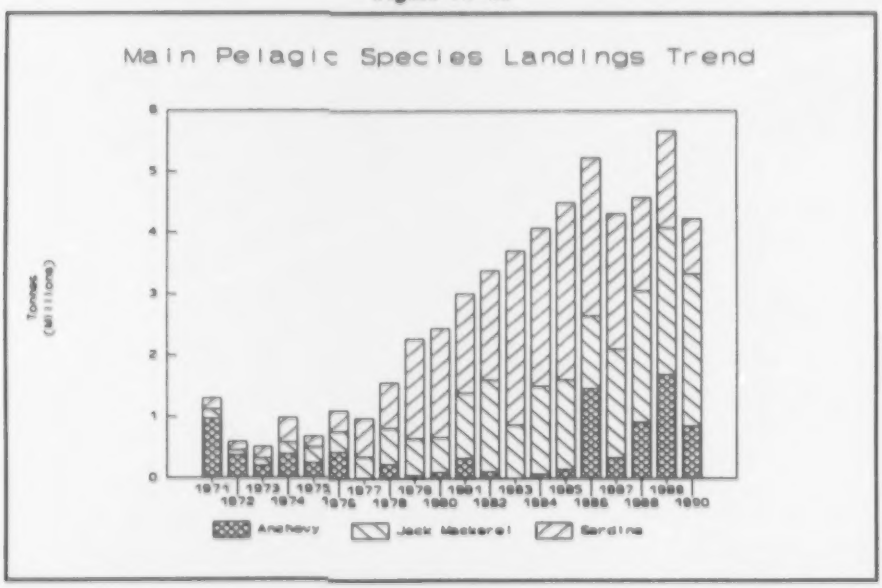
stocks of northern Chile, but the harvest levels were unstable and the fishery finally collapsed in 1972 (see Figure VI 10). But this was not simply the result of overfishing. There are periodic changes in the Humboldt Current that cause a rise in the water temperatures. This phenomena, known as the "El Niño", forces the anchovy to move to cooler waters further off-shore and out of range of the fishing fleet, causing a significant drop in harvest levels. The El Niño of 1972 is cited as the main cause of the anchovy stock collapse, but it is likely that overfishing was also a contributing factor.

Figure VI 9



Source:
Annex VI 1
Table E.

Figure VI 10



Source:
Annex VI 1
Table C.

A year after the collapse of the anchovy fishery, the Pinochet government took power and began to privatize the fishmeal industry. Industry profits were unusually low at the time because of the reduced harvests, and many private interests bought into the industry at bargain prices [Jose Raùl Cañon, pers. comm.].

By the late 1970s the northern regions had become the most important and the most industrialized fishery of Chile. Continued growth was possible despite the collapse of the anchovy stocks because the industry invested in larger and more efficient vessels which enabled them to increase their landings of sardine. Total sardine landings increased from 50,000 tonnes in 1973 to 1.6 million tonnes in 1981 while at the same time the average size of vessels increased from about 150 to 230 cubic meters. Efficiency was also improved with the introduction of transport ships which allowed the purse seiners to stay at sea for longer periods of time. Despite this efficiency, sardine landings have been declining steadily since 1987 and anchovy, and jack mackerel landings dropped in 1990 (see Figure VI 10). Many researchers believe that this is a clear indication of over-fishing. IFOP estimates indicate that only seven to 33 percent of the capacity of the north and south/central industrial fleets were being utilized in 1990.

3.3.2 Development of the Demersal and Mullusc Fisheries

Historically, these species were exploited almost exclusively by the artisanal subsector to serve the domestic market. In addition to developing an export-orientated fishmeal industry, Chile's fishery development plan of the 1960s also aimed to improve the diets of low income groups by increasing fish consumption and determine the extent and abundance of the country's fishery resources through research.

The government carried out a promotional campaign to educate people on the nutritive value of fish, but it appears to have had little success (Table VI 3). During the period of the Allende government there was some increase, but this was probably the result of that government's program to purchase fish from artisanal fishermen to be distributed free to the poor. The limited domestic market for fish and shellfish meant that any significant growth in the demersal and mulluscs fisheries industries depended on the development of an export market.

Table VI 3 Average Consumption of Fish and Shellfish

Year	Annual per Capita Consumption (kgs)	Percent of Total Animal Protein
1965	4.4	12.3%
1971	5.2	12.5%
1972	6.0	15.0%
1973	7.3	19.7%
1974	6.0	15.0%
1975	5.5	14.0%
1980	5.8	15.7%
1981	4.9	12.3%
1982	4.6	11.9%
1983	4.5	12.2%
1984	4.8	13.8%
1985	4.9	15.1%
1986	4.9	15.1%
1987	4.7	13.9%

Source: ODEPA Y CHILE PESQUERO. Dic. 1983 y Ago. 1986

Research was encouraged by the establishment of a Department of Fish and Game research centre at Valparaiso and the provision of funds to sponsor research at universities.

The macro-economic policies of the Pinochet Government in the 1970s to encourage exports were not sufficient to encourage exports of demersal fish and mulloscs. However, growth was encouraged in the mid-1980s when the Government established a program to promote "non-traditional" exports, including fish for human consumption. One of the most important components of this program was a 10 percent drawback paid to exporters.

At the same time that the export promotion program was in place, an increase in the harvesting capacity of the artisanal sector was aided by two credit programs funded by the IDB. The first of these programs ran from 1983 to 1985 and provided loans totalling US$ 16 million to 1,933 artisanal fishermen. Sixty percent of these loans went to fishermen in the northern regions, while 12 and 17 percent went to the VIIIth and Xth Regions respectively. Most of this money was spent on motors, hulls and nets, and led to an increase in the artisanal fleet of about 800 vessels.

The second credit program provided a total of US$ 8.9 million to 263 fishermen between 1986 and 1988. This program was different from the first in that it was intended to increase the fleet of lanchas (see Table VI 2) in order to supply the new export-orientated fish processing industry developing in the central and southern regions. Between 1983 and 1989 the number of lanchas increased 70 percent, and most of this increase was in the Vth, Xth and XIIth Regions.

Also at this time the government undertook measures to develop the southern fisheries. It was recognized that there was little pollution in this region, and that the large fluctuations in the tide provided ideal conditions for healthy populations of high quality mulluscs. Fishermen were offered an allocation of land to encourage them to relocate to the south, and the IDB credit program provided the funds they needed to purchase fishing equipment. The result was an increase in the number of fishermen in the south (Regions IX, X, XI, and XII) from 17,000 in 1983 to over 28,000. Almost 50 percent of all artisanal fishermen are now located in the south, and 40 percent are in the Xth Region alone (see Figure VI 14).

The growing exports of fish for human consumption were also supported by the activities of PROChile. It has helped producers to organize according to their products so that they can explore new markets more efficiently. These organizations are also useful in developing common packaging and quality standards which has helped to increase prices. Educating producers on the need for consistent and high quality in their products is another function of PROChile. It has even arranged for foreign technical experts to travel to Chile and advise producers on the best methods to assure high quality. PROChile also organizes trips for potential foreign buyers to visit Chile, and export producers to travel to international trade shows to help establish contacts. Most of these activities, although organized by PROChile, are funded by the industry [Rose Marie Bedecarraz, pers. comm.].

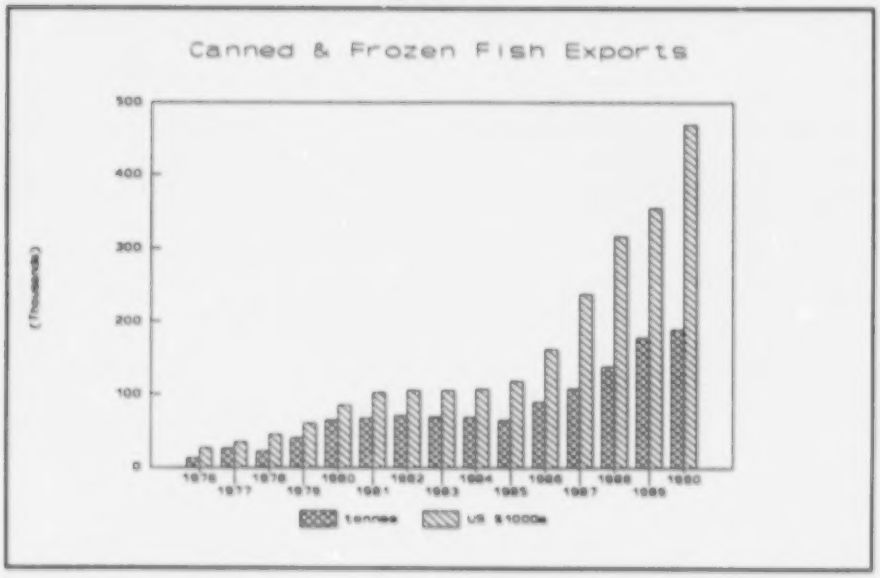
The value of canned and frozen fishery products exports, made mostly from demersal species and mulluscs, has increased 340 percent since 1984 (Figure VI 11). Until 1988, the harvest of these species grew to meet the growing demand of the export-orientated fish processors (Figure VI 12). The decline in harvest levels in the past two years is believed to be an indication of over-exploitation.

3.3.3 Development of the Seaweed Industry

The growth of the seaweed harvesting and culturing industry was mainly the result of two factors. A foreign market for the product was established in the early 1980s, and at the same time there were very high levels of unemployment in the country. People migrated to the coast and were able to enter the seaweed harvesting industry because it required no investment. More recently, the growth of the industry is also the result of decreased fish harvests, due to resource depletion, forcing some artisanal fishermen to find alternate sources of incomes.

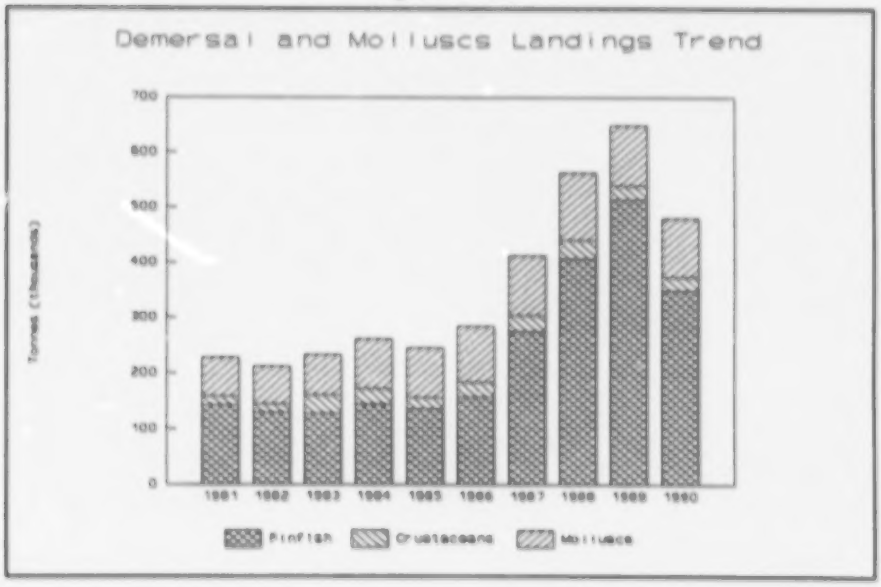
There is no recorded production of seaweed until 1980, when about 75,000 tonnes were produced. Since then annual production has increased (although not steadily, see Figure VI 13), and by 1990 it had reached almost 230,000 tonnes. The industrial aquaculture sector entered the industry in 1982, and now accounts for about 15 to 20 percent of the total production.

Figure VI 11



Source: Annex IV 1, Table E.

Figure VI 12

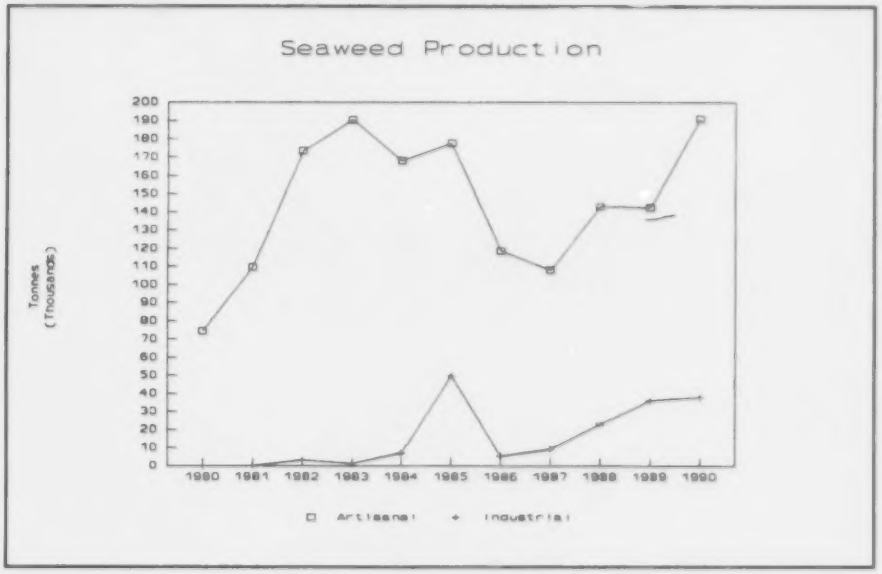


Source: Annex VI 1, Table D

The culturing of seaweed and fish brings with it the need to establish property rights for the ocean's floor. Property rights are allocated by Chile's concession system. Basically, this system allows a commercial enterprise, either a company or a fishermen's cooperative, to gain ownership of a specified area for the purpose of aquaculture. The bureaucratic process to obtain a concession is onerous, requiring that a map and a management plan be drawn up, and that approval is given from six different municipal, regional and national

government agencies. Without assistance from university staff, many communities would have difficulty in simply applying for a concession.

Figure VI 13



Source: Annex VI 1, Table F

Once a concession is awarded, half of its total area must be seeded within one year, requiring a significant investment. There is also a tax that must be paid immediately, and another which is paid every six months.

The small-scale seaweed producers can be in competition with the industrial seaweed and salmon producers for concessions. The industrial operators have an advantage because they are not constrained by lack of human or monetary resources. In addition, there appears to be a bias in the allocation of concessions that favours industrial over small-scale production. In the community of Linao on the island of Chiloe, for example, an application for a concession for the small-scale culturing of seaweed was turned down by the National Marine Authority because the site chosen was deemed "strategic." Later, a company was awarded a concession in the same area for salmon aquaculture. Small-scale seaweed producers have expressed concern about being forced out of the industry, especially since the new fisheries law does not differential between large and small-scale producers.

There is little evidence of government support for seaweed culturing, yet many fishermen's organizations have identified that this industry will continue to be an important source of income in the small rural fishing communities. Most of the research and extension work appears to be carried out by universities, and if funding is available, it is usually provided by a foreign aid agency.

3.3.4 Aquaculture Development

Salmon aquaculture is a relatively new industry in Chile, and since its inception in 1980, it has grown an average of 200 percent per year. Its success has been attributed to a comparative advantage stemming from lower labour and feed costs [Price Waterhouse, 1991, p. 89]. Other important factors are the ideal conditions in the south and the fact that Chile's salmon are harvested when fresh salmon is not available in the northern hemisphere. The industry has also benefitted from a great deal of government support. Fundacion Chile, a joint industry/government organization, has played a significant role in conducting research and developing

technology suitable for Chile. They ran their pilot operation in southern Chile with a business approach and once it was showing a profit, it was sold to a foreign company. Other private companies were then able to enter the industry, without having to incur the risk and expense of developing new technology.

The industry also received extensive support in developing its export markets by PROChile. Some of the most extensive services offered by this organization were provided to the salmon producers. It was fundamental in establishing the salmon producer's organization and in 1987, carried out a promotional campaign on their behalf. The reasoning behind PROChile's special attention to this industry was the belief that this was a promising industry that would attract new entrants if the risk was reduced [Rose Marie Bedecarraz, pers. comm.].

4. STRUCTURAL ADJUSTMENT AND THE FISHERIES SECTOR

Chile's fisheries sector has grown remarkably in the past twenty years. In this section the relationship between this growth and the macro-economic policies pursued by the Pinochet Government is explored. Also examined are the impacts these policies have had on the health of the fisheries resource, employment and incomes in fisheries, the domestic demand and supply, the structure of the industry and the cost structures within the subsectors of the industry. Finally, the socio-economic impacts of changes in the fisheries sector on the artisanal fishing communities are discussed.

4.1 Pressure on the Fisheries Resource

The fisheries sector was seen as a good candidate for the development of an export industry because it was clear that the resource could supply much more than what was required to meet domestic demand. Therefore, in addition to the incentives offered by the exchange rate and open market policies of the Pinochet government, programs directed specifically at increasing fish product exports were also implemented. The fishing industry responded to these policies and production and exports increased.

During the same time period, the Pinochet Government undertook a plan to reduce the number of government employees involved in fisheries management, and improve the efficiency of the remaining staff through training and the use of more modern equipment. But the recession of 1975 led to the cancellation of the training and modernization plan, and only in the past two years has it been reactivated.

The government's delay in investing in its fisheries management capability can be attributed to a number of factors. Despite the limited government intervention in the industry, fish harvests continued to grow, giving the impression fisheries management was unnecessary. Although researchers and academics were warning that continued growth was not sustainable, they were not believed until the harvest levels began to decline. When government officials were finally convinced of the need for better resource management, structural rigidity within the government did not allow for an immediate re-allocation of resources [Hector Bacigalupo, pers. comm.].

The net result was that government resources to manage fisheries did not grow in proportion to the growth of the industry. The shortage of resources for enforcement reduced the effectiveness of the management measures used by Chile in the past, and have likely contributed to the over-exploited state of an estimated 70 to 80 percent of the country's commercially important stocks.

Enforcement tends to become more difficult as fishery resources are depleted and the temptation to circumvent regulations is greater. It is therefore likely that the need for enforcement and other government interventions in the industry will intensify. The fact that SERNAP, the fisheries monitoring and enforcement agency, has recently hired an additional 100 people in the south suggests that the problem has already become critical in at least one area.

Another factor contributing to over-fishing in Chilean waters was the lack of effective management measures. The need to limit access to the resource was recognized in 1985 when the government began discussions on the

new fisheries law. Not surprisingly, this view was not shared by the fishmeal industry. The industry carried out their own biological research and concluded that limiting access to the resource is not only unnecessary, but also impractical. They argued that because pelagic species are migratory, regulating the harvest will only succeed in conserving the stocks to be caught by another country's fishing fleet once they move out of Chile's EEZ. Further, they feel that even if one species is depleted, the Humboldt Current provides such a rich nutrient base, it will be replaced by another species to fill the "environmental niche" [Jose Raùl Cañon, pers. comm.].

Mr. Humberto Chamorro [pers. comm.], president of CONAPACH (National Confederation of the Artisanal Fishermen of Chile), pointed out that this theory serves the industrial fishmeal industry very well. It suggests that they should have unlimited access to the fishery and allows them to maximize their profits now. If the fishery should collapse, the companies can simply move their investments to other sectors with higher profit potential. Judging by their current diversified investment portfolios, these companies appear to be well prepared for this eventuality. The view of the artisanal subsector is entirely different because they do not have the same mobility and hope to continue to fish in the same area over the long term.

The fact that it took six years of discussions before the new fisheries law was passed attests to the lobbying power of this large, wealthy and well-organized industry. Once the new law is implemented, the fishmeal industry access to pelagic resources will be restricted for the first time.

The new law also contains provisions that will allow the revenues from licence fees and penalties to be spent on fisheries management and research. However, for some fisheries it may be too late. The demersal and mullusc stocks in the Xth Region, for example, have been seriously depleted due to over-fishing. The resulting drop in harvest levels brought on the bankruptcies of three of the region's largest processing plants, and layoffs of hundreds of people [Capurro, 1991, p.15]. Resource depletion is also evidenced in the declining harvests of the northern pelagic industry since 1987. This has caused the VIIIth Region to become increasingly important in the harvest of pelagic species.

The Pinochet Government policies encouraged the growth of other export-orientated industries such as lumber and mining, as well as fishmeal, but did not implement environmental protection laws. As a result, pollution has been a serious and increasing problem that has had detrimental effects on the fisheries resource in some regions. Some of the most serious problems have been experienced in the highly industrialized VIIIth Region where some fish stocks have been completely wiped out as a result of pollution.

4.2 Employment and Incomes

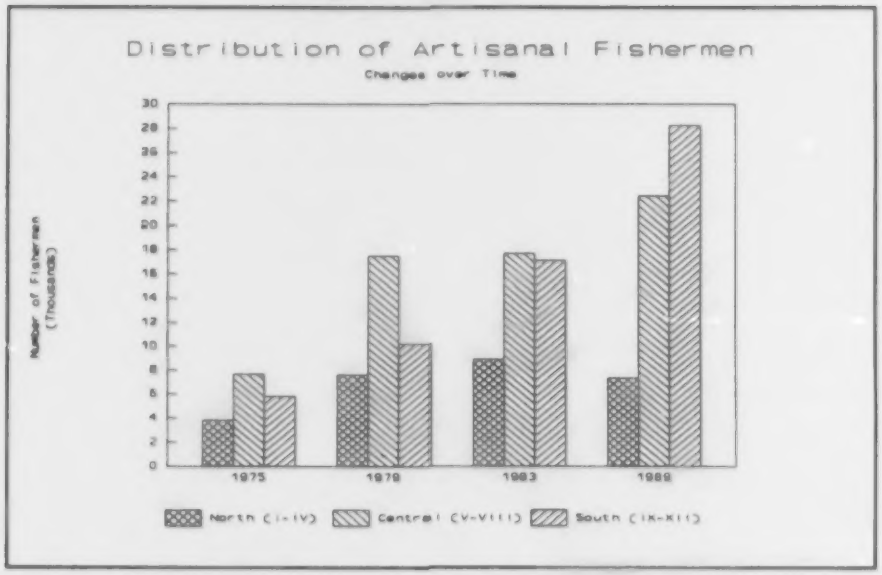
Since 1974 the number of artisanal fishermen has increased from an estimated 17,000 to almost 60,000 (Figure VI 14). This growth can be attributed partially to structural adjustment policies, to the extent that they contributed to high levels of unemployment, and partially to the prevalent perception that fishing was a good business.

Some of the adjustments in the Chilean economy encouraged by the Pinochet Government's macroeconomic policies contributed to unemployment. In agriculture, for example, production shifted away from wheat and towards lumber and fruit for export, both of which were encouraged by the Pinochet Government. Because lumber and fruit production is less labour intensive and provides mostly seasonal work, many workers were displaced. During periods of high unemployment in the 1970s and 1980s many people migrated to the coast to participate in the artisanal fishery, mostly as seaweed harvesters, but also as small-scale fishermen.

People also moved to coastal areas not because they were unemployed, but because they felt that fishing offered the potential to earn higher incomes. This potential was augmented by the IDB credit program and the high demand for demersal fish and mulluscs during the 1980s.

Incomes in the artisanal sector are estimated to range from about US$ 100-200 per month for the smallest operators, to as much as US$ 1000 per month for some of the largest operators. As the majority of the artisanal sector is made up of the smaller operators, average incomes are low, and as a result of resource depletion, are declining in some regions.

Figure VI 14



Source: Annex VI I, Table A

Low incomes in the artisanal subsector have long been attributed to the fishermen's lack of bargaining power. Sales are generally made to intermediaries or processing plants, which in some regions can be the sole or one of few buyers. Artisanal fishermen suggest that the evidence of this problem is the fact that increases in world fish prices have not been reflected in the prices paid to artisanal fishermen [Humberto Chamorro, pers. comm.].

For the artisanal labour force as a whole, though, productivity per person increased steadily from 5.86 tonnes per person in 1975 to 11.01 in 1989. The catch per boat also increased from 36.6 tonnes in 1980 to 42.1 in 1989. The real consumer price of fish over this period, in 1975 pesos, increased between 67 and 100 percent [Bustamante, 1989 p. 313]. The value of the catch per fisherman destined for the local market rose therefore, by 160 to 180 percent in real terms. It is not clear how much of this increase was retained by the artisanal fishermen and how much accrued to intermediaries. Some evidence suggests that margins grew faster than producer prices in the 1984-87 period and ranged from 35 to 137 percent of the landed price of fish [Ibid, p. 315]. Overall it is likely that artisanal fishermen who were supplying the local market and who were not affected by resource depletion, increased their real earnings over this period. But without further information on ownership, prices, margins and input costs, we simply cannot be sure. Those supplying the export market ought to have benefited significantly, but again the distribution of benefits is unknown.

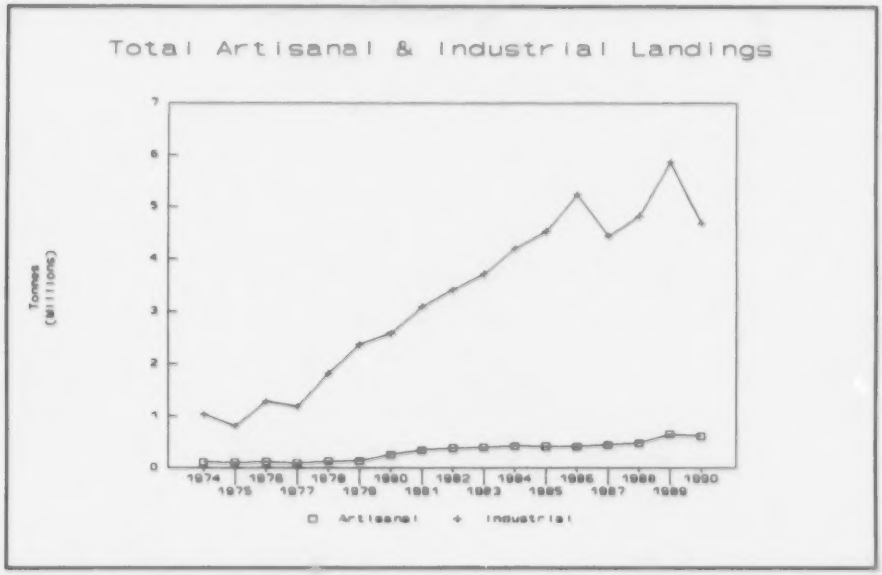
In the industrial sector, ships crews make higher than average wages, and the captains can make very high salaries. The processing sector is also an important source of employment, especially for women. And while wages are not higher than what women would make in other industries, jobs in fish processing plants are of a higher status than the alternatives available to women (eg. domestic maids).

4.3 Changes in the Structure of the Industry

The government's emphasis on encouraging exports tended to favour the growth of the industrial subsector (Figure VI 15). Notable exceptions are the largest operators in the artisanal subsector and artisanal fishermen in the southern regions, whose numbers have grown as a result of the growth in the export-orientated food fish industry. This change is clearly reflected in the rapid increase in artisanal landings in the early 1980s (Figure VI 16) and the concentration of artisanal fishermen in the southern regions (Figure VI 14).

As discussed in the previous section, policies to encourage the growth of the food fish industry coincided with the IDB credit program. Many artisanal fishermen believe that because of the way the IDB credit programs were administered, the loans were not equally available to all fishermen [H. Chamorro, pers. comm.]. Those with more information, or who were better connected with the government, or who were simply shrewder businessmen were more successful in obtaining loans. In addition, the availability of cheap credit attracted businessmen from other industries who only had to obtain an artisanal fishing licence to be eligible for a loan. They were then able to secure a loan, buy a boat, and hire fishermen to work for them. This new pattern of ownership has not been studied, so there is no data available to measure the extent of this trend. It is clear however, that many of the lanchas now earning high returns in the Vth and VIIIth Regions were purchased with IDB credit. Therefore, it can be said that the combination of the two programs led to a differentiation within the artisanal sector into low and high income fishermen.

Figure VI 15



Source: Annex VI 1, Table G

While the IDB credit program appears to have had a major impact, the government's macro policies on credit have had little effect on the fisheries sector. Regardless of the availability of credit, artisanal fishermen are considered bad risks by banks and are therefore unlikely to be able to secure commercial loans at any time. The diverse and large investment portfolio of those in the industrial subsector indicate that their growth has not been restrained by tight credit policies.

The other major structural change in the artisanal fishery was the mass movement of fishermen to the south (Figure VI 13). This movement was actively supported by the government to provide the raw material for the growing export market for demersal species and mulluscs. The IDB credit program also played a role in this change by allowing both new and fishermen from other regions to purchase the equipment they needed to participate in the new industry. Some especially entrepreneurial fishermen took advantage of the incentives and organized the movement of groups of fishermen to the south, set them up to fish and paid them a share of the profits. Again there are no data available on the extent of this pattern of ownership, but it is likely to have lead to some differentiation in income levels.

The fishmeal sector is currently undergoing a structural shift that involves the movement of its fishing and processing capacity south as resources in the north are being over-exploited. It is also beginning to shift towards the production of a higher value-added product so that profit levels can be maintained even if fish harvests drop.

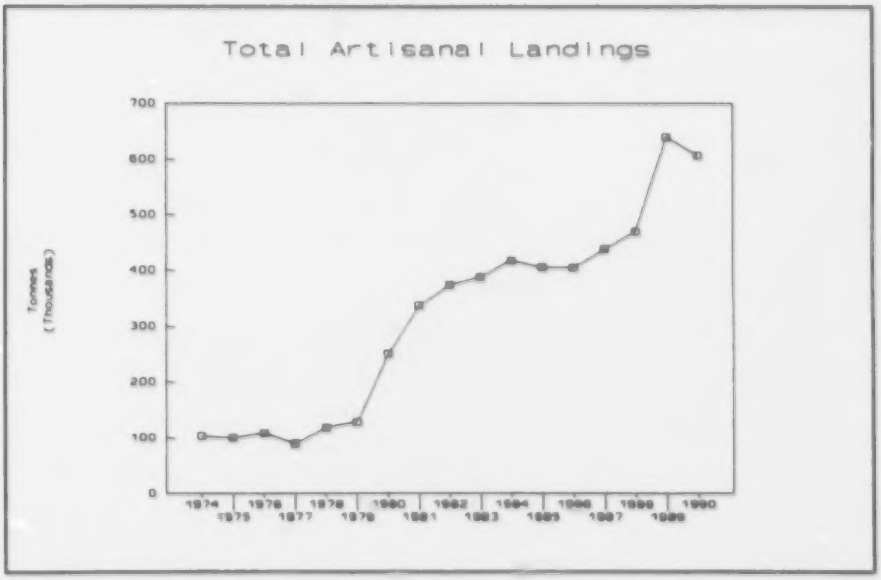
The organization of artisanal fishermen has also undergone major changes over the last 30 years. During the 1960s fishermen were organized under the concept of cooperativism in a process that was parallelled in many other sectors of the economy. The growth of cooperatives continued during the three years of the Allende Government, bolstered by the organizational assistance and the provision of inexpensive credit offered by the government to cooperatives. When Pinochet took power, government programs to support and encourage cooperatives were not only dropped, but as cooperativism was seen as a leftist activity, they were actively discouraged. Fishermen's cooperatives quickly disappeared, leaving the artisanal subsector with no organization and consequently no lobbying power, while at the same time, the industrial sector was growing, becoming more organized, wealthy and powerful. The most dramatic effect of this imbalance of power was the success of the industrial subsector's lobbying efforts in delaying the passing of the new fisheries law.

The current organization of artisanal fishermen began in 1985 and was an attempt to re-create the cooperative system of the early 1970s. This was not supported by the government and in fact, they attempted to pre-empt it by creating a government controlled fishermen's organization [H. Chamorro, pers. comm.]. This attempt failed and the national confederation has since continued to grow.

4.4 Domestic Supply and Demand

Despite the growth in the number of artisanal fishermen in the 1970s, artisanal production remained relatively stable until 1980 (Figure VI 16). The reasons for this are not clear. It may have been partially due to the decrease in domestic demand that must have resulted from the abolishment of Allende's program to provide fish to the poor and the drop in per capita incomes. It is also likely that the production figures do not reflect any increases in the direct consumption of fish by fishermen and their families that probably took place at this time.

Figure VI 16



Source: Annex VI I, Table G

Beginning in 1980, the artisanal harvest increased rapidly to fill the increased export demand. However, the domestic market remains important, especially for the smallest operators within the artisanal subsector. As discussed in a previous section, the market is small because of Chile's small population and its low per capita consumption of fish. Whether or not this low domestic fish consumption, which did show a drop of about one kilogram per capita per year between 1980 and 1981 (Table VI 3), is related to structural adjustment is not clear. Discussions with academics generated several possible causes for low fish consumption including: poor marketing and presentation of the products; high prices relative to substitute products (which may have been driven up due to the demand for fish from the export market); greater availability of substitute products resulting in lower prices (eg. industrialized chicken production began in 1980/81); the low status of fish relating to traditional tastes and preferences; and lack of consistent supply and quality. It has also been suggested, that while much was done to support the industrial subsector and the export industry, little has been done in the past twenty years to support the artisanal fishermen serving the domestic market. As a result, this subsector continues to suffer from inadequate access to markets due to the poor market infrastructure.

4.5 Cost Structures

Current cost data were available for selected types of artisanal and industrial vessels in the VIII^{b} Region (Tables VI 4 and VI 5). These indicate labour is the single greatest component of the variable costs of the artisanal vessels and the industrial purse seiners. The industrial trawlers have a relatively low labour cost, but fuel and oil make up about 50 percent of their variable costs.

Fuel and oil are the main imported inputs for all types of vessels. Although historical data was not available on the cost structures of vessels, it is likely that the prices of fuel and oil, and therefore their portion of total variable costs, have increased as the exchange rate was adjusted by the Pinochet Government. Yet in the artisanal subsector, they still make up only seven to 13 percent of the total variable costs. In the industrial subsector fuel and oil make up a much greater portion of variable costs (about 30 to 50 percent), but as the production of these vessels is sold in foreign markets, the increased expense is likely offset by the increased revenues.

Data on the cost structures of the processing industry were unavailable, but discussions with industry representatives revealed that a distinction can be made between the input costs of those serving the domestic market and those involved in fish meal manufacturing and fish processing for export markets. Plants competing on the world market are the largest and most capital intensive. Some of their capital equipment is imported, but again, because they are selling on the world market, higher revenues offset the higher cost of this equipment. Those plants serving the local market are not in competition with the exporting firms and can therefore afford to be smaller and less capital intensive. Most of their capital equipment is either domestically produced or purchased second hand from other plants. As capital, labour and fish are the main inputs of the industry, they are less directly affected by the exchange rate policy.

The main impact of structural adjustment on the fish processing plants serving the domestic markets is related to the fishery resource. Fluctuations in the supply of raw material can lead to over-capitalization as they attempt to build the capacity to deal with the peak periods, or an inability to provide a consistent level of supply to their customers.

4.6 Socio-economic Impacts

Almost immediately after seizing power in 1973, Pinochet abolished the previous government's program to purchase fish from artisanal fishermen to distribute to the poor. This had a direct negative effect on the poor, while at the same time reduced fishermen's incomes. But most of the socio-economic impacts of structural adjustment were indirect, relating to its role in the depletion of fisheries resources and the structural changes in the fishing industry discussed in the previous sections. Many fishing communities are now facing economic problems associated with declining stocks due to overfishing and pollution from industrial development and

inadequate access to markets due to poor market infrastructure and monopoly among the intermediaries. In addition to these economic problems, rural fishing communities, especially in the south, have not had access to the same level of health care and education enjoyed by Chileans in urban areas.

Table VI 4 Cost Structures of Various Types of Artisanal Vessels, VIII Region, December, 1990.

	Purse Seiner (12-18 meters)		Longliner (12-18 meters)		Swordfish Boat (12-18 meters)		Longliner (7-12 meters)		Gillnetter (7-12 meters)	
	pesos (000s)	% of Revenues	pesos (000s)	% of Revenues	pesos (000s)	% of Revenues	pesos (000s)	% of Revenues	pesos (000s)	% of Revenues
Estimated Gross Revenues	28,800	100	18,720	100	24,000	100	16,848	100	14,580	100
Variable Costs										
Fuel & Oil	939	3	1,178	6	1,504	6	1,221	7	1,221	8
Labour	9,720	34	6,106	33	8,109	34	6,628	39	5,267	36
All Other	2,498	9	2,486	13	3,434	14	2,810	17	2,810	19
Total Variable Costs	13,157	46	9,770	52	13,047	54	10,659	63	9,299	64
Return to Boat	15,643	54	8,950	48	10,953	46	6,189	37	5,281	36

Source: Field data and secondary data from CORFO and IFOP

Table VI 5 Cost Structures of Various Types of Industrial Vessels, VIII Region, December, 1990.

	Purse Seiner (60-70 meters)		Purse Seiner (40-60 meters)		Purse Seiner (30-40 meters)		Trawler (30-40 meters)	
	pesos (000s)	% of Revenues	pesos (000s)	% of Revenues	pesos (000s)	% of Revenues	pesos (000s)	% of Revenues
Estimated Gross Revenues	794,970	100	593,505	100	337,590	100	481,800	100
Variable Costs								
Fuel & Oil	92,079	12	75,899	13	53,129	16	52,451	11
Labour	168,201	21	123,551	21	65,934	20	23,407	5
All Other	84,609	11	52,060	9	33,525	10	29,133	6
Total Variable Costs	344,888	43	251,509	42	152,588	45	104,990	22
Return to Boat	450,082	57	341,996	58	185,002	55	376,810	78

Source: Field data and secondary data from CORFO and IFO

As fishermen moved to the south during the 1980s, many fishing camps were established throughout the islands in the region. Since then, these camps have become permanent homes for the fishermen and their families, but the living standards have improved very little. The problem has been difficult to address because the families are scattered throughout the islands, making the provision of services such as housing, education and health care, by the state difficult and costly.

Other social problems are related to the nature of the fishery which requires that fishermen follow the resource. Fishermen are away from home for extended periods, leaving their families dependent on the incomes that the women are able to earn by collecting mussels on the beach, selling crafts, and raising sheep and poultry.

Incomes are generally low for the artisanal fishermen in the south, yet both living and fishing costs are very high. This is partially due to transportation costs, but it is also related to their lack of bargaining power. As fishermen in the south organize, they are beginning to realize that their incomes will be improved by working together, combining their production and bargaining with buyers as a unit instead of being forced to accept whatever price offered to them individually.

Many of the people who moved to the south (and other coastal areas) to harvest seaweed also live in very poor conditions. They too established themselves in camps which have since become permanent homes without any significant improvements in living conditions. Recently, their welfare has be further reduced because of the drop in seaweed prices.

With the increased interest in the culturing of seaweed these people face an additional problem. Traditionally, they have had exclusive rights to certain harvesting areas simply on the basis of their occupation of the beach. They have not applied for the concessions because of the costs involved and because it would mean they would have to pay taxes. With the concession system, the possibility now exists for the legal rights for these areas to be awarded to other interests.

The increased fishing in the south has clearly been detrimental to those who were fishing in the area before 1980. On the island of Chiloe for example, people historically combined fishing with farming, and in the 1980s added seaweed harvesting to their economic activities. These people are now facing problems in all three areas of economic activity. In farming, their tradition has been to divide the family farm among the sons, with the result that the average size of farms shrinks with each generation. Now most farms are only big enough to provide food for the family's own use, leaving no surplus for sale. Due to the largely unregulated harvests of both the artisanal and the industrial subsectors in the waters surrounding the island throughout the 1980s, the fishery is now so seriously depleted that many fishermen do not even bother to go fishing. And finally, the recent drop in the world price for seaweed has had devastating effects on income levels in some communities on Chiloe. This is particularly disturbing because seaweed harvesting or cultivation has been seen as an ideal replacement for fishing.

The combination of events in the south is expected to lead to a migration of fishermen into the cities and there is some indication that this has already started. The concern of course, is the limited employment opportunities available to them in the cities. Most fishermen have a relatively low education level, and little experience in other industries. The current challenge, therefore it to keep people in the rural areas by diversifying the southern economy.

Generally, and with the exception of the largest artisanal fishermen, incomes and living standards for the average artisanal fisherman have not improved much in the last 20 years. Periodic booms have allowed many fishermen to increase their consumption of consumer goods (eg. televisions, radios, stereos) giving them some sense that things are getting better; but income levels remain low, housing is still poor, their children are not getting better educated, and they still have no social security. In addition, many of the poorest communities suffer from same social problems, such as alcoholism and domestic violence, that tend to plague the poor in North America.

5. LESSONS/ISSUES FOR FURTHER STUDY

There is no doubt that the structural adjustment policies of the Pinochet Government have had an effect on the fisheries sector of Chile. It is difficult however, to separate the impact of these macroeconomic policies from those of the fisheries development programs implemented during the same time period. Together they stimulated significant growth and change within the sector, which over time has led to a depletion of the resource base.

The quantitative analysis possible in this study was limited by the availability of reliable historical data, especially economic data. While this precluded the precise measurement of the effects of structural adjustment

on the fisheries sector, it does suggest that future study should focus on gaining a better understanding of the economics of the industry and the relation between the economic, biological and regulatory factors that will dictate future growth and change in the industry. Areas of future research should include:

a) identification of the cost and earnings structures for harvesting and processing activities according to different vessel and gear types, species and products, geographical area, and season.

b) determination of the ownership patterns, including the extent of foreign ownership, within the various subsectors of the harvesting and processing industries.

c) determination of incomes and income distribution within the artisanal sector, including the incomes of women helping fishermen and involved in marketing and processing activities;

d) analysis of the strategies adopted under varying conditions by the various subsectors of the industry (eg. responses to changes in resource abundance, markets, new products and technologies).

e) identification of factors restricting incomes for fishermen, women, intermediaries, and processors in the artisanal subsector; the domestic market for fish; the supply of fish and fishery products; rents to boat and plant owners; and the development of the infrastructure for processing, transport, storage and marketing.

The fisheries sector will continue to change. Chile's macroeconomic policies will continue to encourage exports while, at the same time, harvest levels will be restricted due to the reduced resource base and the new fisheries law. The recommended research will provide the knowledge required to understand how the various subsectors within the industry will adapt to these conflicting pressures. It will also identify the economic variables that should be tracked on an ongoing basis. The current fisheries statistics published by SERNAP are limited to production data. At a minimum, prices paid to fishermen and processors should be included in the data base, but ideally, periodic studies should be conducted to identify changes in costs and earning structures throughout the industry.

In some of the areas identified e.g. (a) and (e), Senegal is well ahead of Chile, because fish is perhaps more central to the economy of Senegal in relative terms. Nonetheless, each of the areas of research need is likely to obtain government support and should useful policy lessons emerge from the research one can speculate that the current government might be quite open to embracing them. Certainly, Chile has the required expertise on the ground to undertake the necessary research and the ICLARM representative for Latin America and the Caribbean has expressed interest in co-operating with IDRC/CIDA in part two of this project if it proceeds.

ANNEX VI 1

Statistical Tables

Table A. Change in the Regional Distribution of Artisanal Fishermen

Region	1975	1979	1983	1989
I	715	798	1131	1413
II	1100	1856	1923	1752
III	230	1198	1292	889
IV	1750	3746	4519	3257
V	3457	4116	3886	7281
VI	300	1179	1314	1525
VII	351	1145	1249	1743
VIII	3525	11013	11194	11888
IX	310	660	890	1091
X	4662	7228	13965	22702
XI	452	914	1032	1356
XII	330	1426	1236	3099
Total	17182	35279	43631	57996

Sources: 1975 - INDAP; 1979 & 1983 - SERNAP; 1989 - IFOP

Table B. Landings of Major Species Groups by Region and Subsector, 1990

Region	Pelagic Species[1]		Demersal Species[2]		Molloscs		All Species	
	Industrial	Artisanal	Industrial	Artisanal	Industrial	Artisanal	Industrial	Artisanal
				(tonnes)				
I	1,300,494	14,698	2,925	2,021	0	3,992	1,303,419	21,224
II	563,056	3,655	0	2,260	0	3,659	563,056	9,748
III	212,598	10,108	1,873	4,181	0	1,663	214,471	16,337
IV	99,009	25,820	5,806	6,187	0	2,682	104,815	36,144
V	153,158	16,320	11,823	12,558	7	1,556	164,988	30,707
VI	0	2	0	519	0	509	0	1,068
VII	351	259	1,993	4,991	0	1,970	2,344	8,065
VIII	2,150,622	136,689	145,975	9,526	0	4,141	2,296,597	151,151
IX	0	9	0	2,083	0	372	0	2,474
X	61	8,862	10,393	22,120	0	72,686	10,454	116,747
XI	10	7	12,282	5,175	0	1,839	12,292	9,133
XII	0	0	2,856	5,474	0	6,797	2,856	12,377
Total	4,479,359	216,429	195,926	77,095	7	101,866	4,675,292	415,175

Source: SERNAP

Notes: (1) Pelagic species landings estimated by summing the landings of anchovy, pacific mackerel, jack mackerel, sardines, and pacific herring.
(2) Demersal finfish landings estimated by subtracting estimated pelagic landings from total landings of fish.

Table C. Landings Trend of Major Pelagic Species

Year	Anchovy	Jack Mackerel	Sardine
		(000's tonnes)	
1971	961	158	175
1972	368	87	132
1973	192	122	188
1974	383	194	399
1975	240	261	165
1976	434	342	327
1977	19	341	621
1978	229	587	733
1979	51	598	1,619
1980	103	562	1,773
1981	325	1,061	1,620
1982	106	1,494	1,780
1983	8	865	2,823
1984	71	1,426	2,572
1985	143	1,457	2,887
1986	1,463	1,184	2,585
1987	336	1,770	2,203
1988	912	2,138	1,526
1989	1,688	2,390	1,590
1990	845	2,472	900

Sources: 1971-1982 FAO; 1983-1990 SERNAP

Table D. Landings Trend of Demersalm Species and Mulluscs

Year	Demersal Finfish	Demersal Crustaceans	Mulluscs
		(tonnes)	
1981	142,431	15,538	69,220
1982	129,503	14,794	66,293
1983	127,830	33,305	71,457
1984	144,248	28,610	88,532
1985	135,566	20,857	89,102
1986	157,376	26,455	100,378
1987	274,032	30,506	107,967
1988	407,365	33,357	120,803
1989	514,180	24,248	110,474
1990	347,354	26,713	105,718

Source: SERNAP

Table E. Main Fishery Product Exports

	Fresh, Frozen and Canned Fish		Fishmeal	
	Tonnes	1000 US$	Tonnes	1000 US$
1976	12,012	26,747	198,283	63,532
1977	25,575	34,722	204,207	78,345
1978	22,093	44,921	277,438	105,445
1979	40,057	61,052	387,181	142,677
1980	64,658	85,387	465,097	202,988
1981	66,845	102,002	455,812	198,004
1982	70,836	104,655	772,719	254,806
1983	69,218	104,738	755,074	307,571
1984	68,782	106,400	781,023	275,500
1985	64,569	117,500	1,112,698	278,900
1986	89,384	161,600	1,089,881	314,900
1987	107,480	236,500	1,095,838	358,300
1988	137,198	314,700	926,155	458,800
1989	177,455	353,500	1,293,559	507,000
1990	188,230	468,200	986,736	379,700

Sources: 1976-1983: FAO Fisheries Statistics Yearbook,
1984-1990: C. Capurro, 1990.

Table F. Seaweed Production (tonnes)

	Artisanal	Industrial
1980	74,523	0
1981	109,631	0
1982	173,375	3,060
1983	190,371	1,237
1984	167,956	6,800
1985	177,486	49,924
1986	118,567	5,332
1987	107,997	9,178
1988	143,030	23,109
1989	142,330	36,150
1990	190,844	38,017

Source: SERNAP

Table G. Total Chilean Landings by Subsector

	Artisanal	Industrial
1974	102,937	1,024,835
1975	100,169	799,289
1976	108,333	1,270,263
1977	88,962	1,168,763
1978	118,187	1,810,901
1979	128,558	2,358,139
1980	250,352	2,570,601
1981	337,735	3,085,252
1982	373,913	3,401,995
1983	387,796	3,707,115
1984	417,309	4,191,842
1985	405,598	4,523,065
1986	405,071	5,232,287
1987	437,899	4,430,385
1988	469,626	4,820,861
1989	640,279	5,866,022
1990	606,019	4,675,292

Source: SERNAP

VII CASE STUDY: PHILIPPINES

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VII CASE STUDY: PHILIPPINES

The Philippines is a nation of more than 7,100 islands stretched over 2,000 miles (from 5° N to 21° N) in the South China Sea. The islands have a combined area of 300,000 square km; the claimed Economic Exclusion Zone (EEZ) of 2.5 million square km is eight times as large. The population of over 62 million (1991 estimate) is primarily rural, with about 10 million people in the five cities of Metro Manila and less than a million in the next largest city.

Urbanization is primarily a post World War II phenomenon, reflecting a shift in economic activity from agriculture, forestry and fishing to manufacturing (assembly) and commerce. These shifts have been brought about by an active Government - controlling prices of agricultural outputs and inputs; protecting manufacturing by tariffs and trade restrictions; making direct investments in capital intensive projects; extending loans (many of which had to be written off later) through state controlled banks; subsidizing fuel and power and so on - allied closely to land owning and other wealthy private groups, seen at its most extreme in the "crony capitalism" of the Marcos era. Investment expenditures, substantially in excess of domestic savings, were financed by local borrowing at controlled interest rates, by commercial and Government guaranteed foreign loans and by trade credits. The Philippines habitually runs a deficit on current account with imports of oil and oil products a significant item.

1 THE ECONOMY BEFORE SAPs

GDP grew at an average annual rate of 5 percent during the 1960s and even more rapidly in the 1970s. This was "above average" for middle income oil importing countries but below rates achieved by the Philippines' ASEAN neighbours. Growth slowed in the early 1980s and GDP fell after 1984, not recovering to its 1983 level until 1989. During the 1960s and 1970s the Philippines population grew rapidly by international standards but more slowly than GDP, allowing per capita income to rise to $US 680 by 1980 (valued at 1985 rates of exchange). Population continued to grow during the 1980s at over 2.5 percent per annum, hence the slowdown and decline in GDP reduced per capita incomes after 1981 to the levels of the early 1970s. In the last few years there has been some improvement, but current per capita income remains well below its 1981 peak. (Figure VII 1).

The impact of reductions in per capita GDP on the poorer sections of the population has been heightened by the maldistribution of income - over half of total family income is in the hands of the 20 percent of the population with the highest incomes. (Data are summarized in Table VII 1.)

About 50 percent of the estimated population of the Philippines is aged 19 years or younger. The number of people entering the labour force grew continuously throughout the 1970s and 80s because of this age structure and because participation rates rose from below 60 percent in 1975 to around 65 percent by 1990. But many of these new labour force participants did not find jobs and the rate of unemployment rose almost without check through-out the late 1970s and early 1980s. The figures under-state unemployment. "Under-employment and unemployment are serious problems; one out of five (persons employed) is officially estimated to be under-employed and over one third of the employed are estimated to be wanting additional work." [EIU, 1990, p. 12] Nearly half the workforce is employed in agriculture, forestry and fishing, another 21 percent are in the service industries (finance, government, community, social and private), and 19 percent are in transport and commerce.

While data series on legal minimum wages are published regularly, data on average wages paid are not. Minimum wage levels are set for industry and plantation employment, and other agricultural work. Non-plantation agricultural wages rose from P 4.75 a day in 1972 to P 20.95 a day in 1983. However, "...many (employees) are excluded from minimum wage provisions - (those in) the public sector, export oriented and labour intensive manufacturing; ... many companies do not pay the (legal minimum) rate." [Ibid, p. 14]

Table VII 1 PHILIPPINES: MAIN ECONOMIC INDICATORS (all % change from previous year unless otherwise indicated)

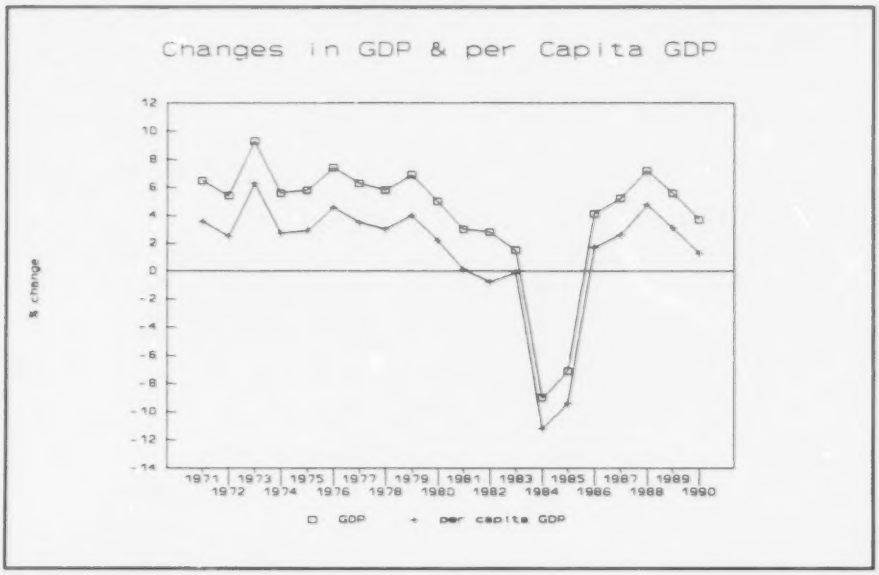
	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Activity & Trade																				
Real GDP	6.5	5.4	9.3	5.6	5.8	7.4	6.3	5.8	6.9	5.0	3.0	2.8	1.5	-9.0	-7.1	4.1	5.2	7.2	5.6	3.7
Real GDP/Capita (1)	3.6	2.5	6.3	2.7	2.9	4.6	3.5	3.0	4.0	2.2	0.1	-0.8	-0.1	-11.2	-9.4	1.7	2.6	4.8	3.1	1.3
Unemployment rate % (level)	--	--	--	--	4.2	5.2	4.5	4.1	4.0	5.0	5.3	6.0	5.4	6.2	7.1	6.7	11.2	9.6	9.2	8.4
Volume Index (level)																				
Export	49.5	51.3	55.3	49.4	52.3	67.0	80.8	78.3	85.6	143.2	137.8	124.4	128.2	138.2	100.0	116.6	124.2	138.2	155.0	166.2
Import	98.3	99.2	92.8	109.5	114.9	121.6	118.3	139.8	152.6	154.5	152.5	162.4	155.8	119.3	100.0	119.7	158.0	191.3	229.3	246.4
Net terms of trade	--	-9.6	13.3	1.1	-23.3	-11.5	-8.6	10.0	4.4	-42.6	4.7	5.1	-3.0	-4.4	17.1	7.9	9.5	11.0	-7.6	-9.9
Wages & Prices																				
Real Wages (2)	--	--	-14.5	5.6	-0.5	8.3	16.3	-2.2	6.0	13.2	-5.4	0.0	-14.5	-6.1	-2.6	0.1	0.1	18.0	5.6	3.6
CPI (3)	--	12.8	11.6	34.1	6.7	9.3	9.9	7.3	17.5	18.2	13.1	10.3	10.0	50.3	23.1	0.8	3.8	8.8	10.6	12.7
Money & Credit (levels)																				
Bank credit, % GDP																				
Public	7.4	6.3	1.0	-0.9	3.3	3.9	4.1	3.9	2.6	3.1	4.1	6.7	13.2	10.8	9.6	12.1	5.2	3.3	3.6	4.5
Private	24.0	27.2	18.8	28.6	29.5	30.5	31.6	34.0	35.5	35.1	36.7	37.9	44.2	31.9	26.1	17.8	18.6	18.4	19.2	20.9
Money supply: M3/GDP %	21.2	21.2	25.0	24.3	25.2	26.8	28.7	29.3	26.3	25.6	27.0	28.4	29.8	23.0	22.0	23.0	22.6	24.1	24.1	27.5
T Bill rate % (4)	12.0	12.2	9.7	10.3	10.5	10.4	11.2	10.9	12.2	12.3	12.9	14.4	14.5	37.0	27.0	16.0	12.9	15.5	19.7	24.7
Imbalances (levels)																				
Imbalance, % GDP																				
Internal (5)	0.4	-0.2	-3.7	1.3	5.3	5.9	3.3	4.3	4.5	4.9	5.1	7.6	7.1	2.7	-1.1	-5.4	0.0	-0.7	1.2	5.2
External (6)	0.7	1.7	-2.1	3.1	8.0	6.4	4.0	5.9	5.6	6.0	6.3	7.3	7.9	2.3	1.6	0.7	3.2	3.0	6.3	9.3
Gov'nt deficit, % GDP	--	--	--	--	1.3	1.9	2.0	1.3	0.2	1.4	4.3	4.6	2.1	2.5	2.0	5.4	2.6	3.0	2.2	3.5
Exchange Rate & Debt (7, 8)																				
Nominal exchange rate	--	-3.6	-1.3	-0.4	-6.3	-2.7	0.5	0.5	-0.1	-1.8	-4.9	-7.4	-23.2	-33.6	-10.7	-7.6	-0.9	-2.4	0.3	-10.8
Real exchange rate	--	--	--	--	--	--	--	--	8.4	5.2	3.2	3.8	-15.9	-1.0	9.4	-22.0	-8.0	-2.8	5.7	--
Debt outstanding																				
$US bn (level)	2.4	2.7	2.9	3.8	4.9	6.8	8.1	10.7	13.4	17.3	20.9	24.7	24.8	25.4	25.3	28.3	28.6	27.9	27.6	28.5
Debt service, % XGS (level)	--	--	--	--	--	--	--	--	--	--	--	42.5	36.3	33.4	32.0	34.5	38.5	31.5	26.3	--

Sources: unless otherwise indicated: Selected Philippine Economic Indicators 1990 Yearbook (Central Bank of the Philippines)

(1) Population from yearbook of National Statistics Office
(2) Fixed daily wage rates in non plantation agriculture deflated by CPI (1978 = 100)
(3) Philippines all items index (1978 = 100)
(4) Average rates through-out the year on 91 day Treasury bills.
(5) Investment minus savings; national income accounting basis.
(6) Imports minus exports
(7) Real exchange rate: International Financial Statistics.
(8) Data on debt: World Debt Tables

The rate of inflation accelerated in the early 1970's but stabilized at around 9 percent per annum between 1975 and 1979. This pattern was repeated in the early 80's before prices jumped 50 percent with the SAP measures of 1984 and a further 23 percent in 1985. The pattern of containment followed by rapid growth was then repeated. The food, beverage and tobacco segment of the index rose marginally less than the all items CPI. The regional index for a typical fishing region (West Visayas) mirrored the all Philippines index.

Figure VII 1



Source: Table VII 1

Even though there have been occasional increases in minimum wages, "real wages have been in decline since the 1960s reflecting the large numbers seeking work, the associated weakness of the trade union movement and, in the early and mid 1980s, slackening job opportunities as the economy stagnated and then contracted. The situation deteriorated sharply after the 1983 payments crisis." [Ibid, p. 13] In 1987 the real value of agricultural (non-plantation) wages was P10.30 (US$0.50) a day, the same level as in 1972.

There is widespread recognition that the rapid growth of the 1970s was accompanied by growing levels of poverty and under-employment. Despite this, national surveys show improvements in broad indicators of health.

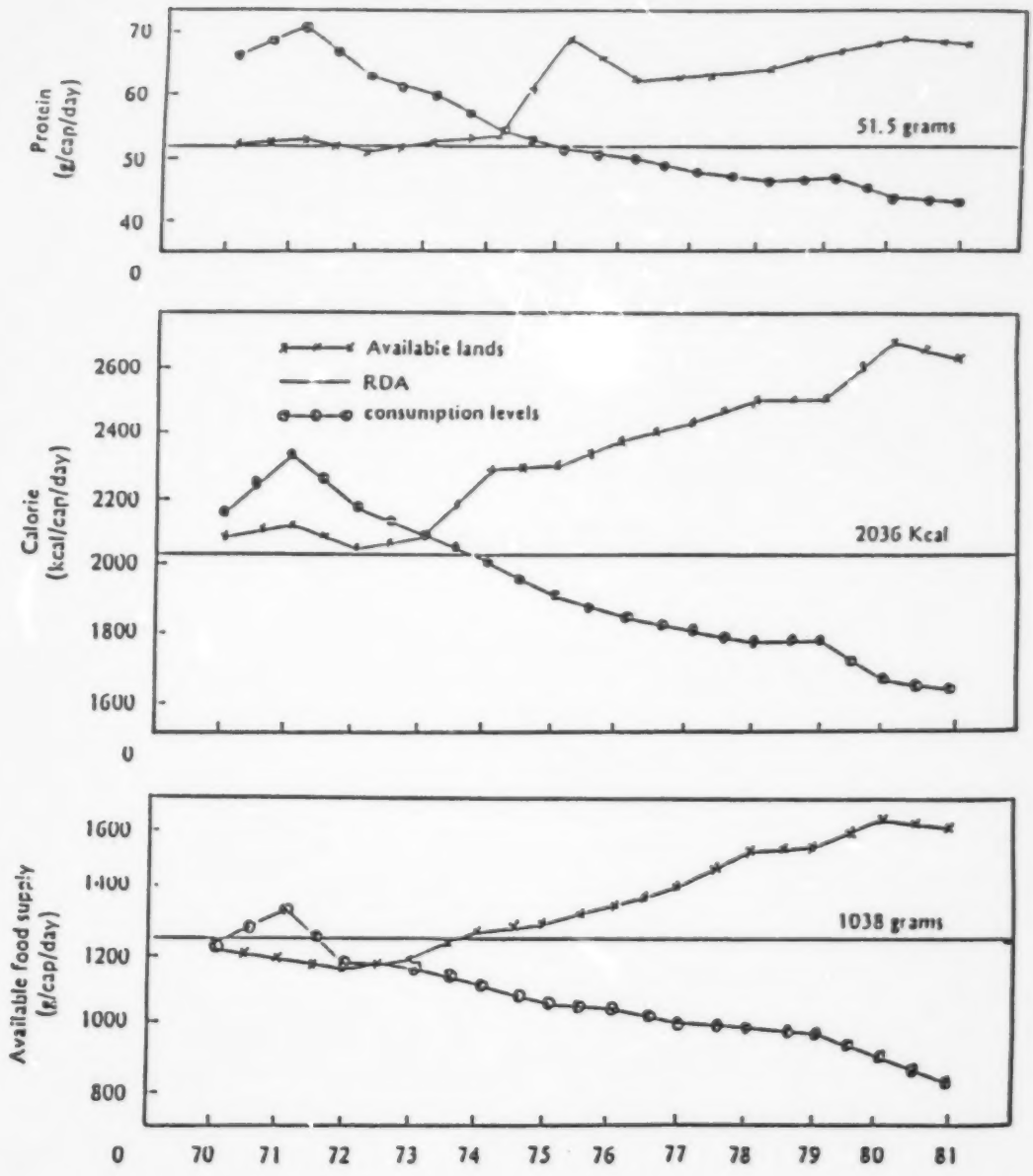
TABLE VII 2 Indicators of Health

	1970	1980	1985
crude death rate (# /1000 pop'n)	11.8	8.7	5.4
infant mortality rate (#/1000 births)	45.5	40.2	32.7
life expectancy at birth (years)	58.1	61.6	---

Source: Kent, 1987

As a lag between a slowdown/decline in economic activity and decline in indicators of health of the population can be expected, it is likely that these (dramatic) improvements did not continue in the latter part of the 1980s. Indeed, later studies might show these figures to have been ephemeral.

FIGURE VII 2 Food availability and consumption



Daily per capita available food supply, calorie and protein and daily per capita food consumption, calorie and protein intakes and recommended daily allowances (RDA), Philippines, 1970-81.

Source: Regalado and Gonzales

Regalado and Gonzales plot apparent per capita available food supply in 1972 to 1981 (from food balance sheet data) against food consumption trends based on Ministry of Agriculture and Food consumption survey data. Their results, reproduced as Figure VII 2, show an increasing divergence between food availability and food consumption, with consumption increasingly falling below recommended daily allowances.

Through-out the 1970s and early 80s the Philippines had substantial internal (investment greater than savings) and external (imports greater than exports) imbalances (Figure VII 3). These imbalances were financed by borrowing abroad, by domestic credit, and by printing money. The attribution of the aggregates should be viewed with caution as the large operating deficits of some public corporations were not formally recognized by the National Government until the re-organization of the banking sector which took place during the SAP process. Writing of a later period the World Bank notes "... if all transfers from the National Government to public corporations were factored in, the deficit of the latter would be higher. Finally, the operating deficits of the Central Bank have been rising since 1987 and are currently about as large as those of the National Government" [World Bank, 1990 p. 36].

Credit extended by the banking sector to the public sector rose from P3.4 billion in 1971 to P46.4 billion in 1983, an average annual rate of increase of 14 percent. Credit to the private sector grew at an average rate of 16 percent per annum. All measures of the money supply grew rapidly in the period 1970 - 1983, and at rates well in excess of monetary GDP. This accommodating monetary stance, coupled with administrative regulation and guidance, ensured that both nominal and real interest rates remained relatively low throughout the period increasing only with the implementation of SAP measures in 1984.

Not surprisingly Government revenues fell far short of expenditures throughout this period. For revenues, the government relies heavily on regressive indirect taxes and duties, with very little collection of direct taxes. In 1966 income taxes were 19 percent of total revenues and had increased to only 21 percent by 1986. In the same period revenue from indirect taxes fell from 59 percent to 57 percent of the total revenues.

The cost of borrowing also affected expenditures. Beginning in the mid 1970s, the share of expenditure going to service government debt rose substantially and, by the end of the 1980s, debt service (interest and amortization on an obligation basis) accounted for over 40 percent of government expenditure.

The Philippines has had a protectionist trade regime ever since import restrictions imposed by the government in response to a balance of payments crisis in 1949 became entrenched. Tentative attempts at liberalization were made in the early 1960s and again at the end of the 1960s and the early 1970s, but they met with little success and were aborted. In 1979 the average rate of effective protection for import competing manufactures was over 58 percent - along with numerous quantitive restrictions. The effect of these restrictions was to enrich the ruling group (the Marcos regime used the patronage of protection for political and material ends) at the expense of labour intensive exports and agriculture. In the 1970s, protection and other Government policies led to the transfer of more than 5 percent of GDP out of agriculture [Jayasuriya].

The lack of incentives for exports and the demand for imports for industrialization and consumption, ensured that the Philippines ran a deficit on current account throughout the period of 1970 to 1983. The composition of exports changed quite dramatically over this period. Exports of agricultural and forest products accounted for 72 percent of all exports in 1971. By 1983 they accounted for only 36 percent but remained significant in value terms. Exports of fish were less than 1 percent of all exports until 1976, accounted for 2 percent by 1980, and became more significant thereafter. Imports are dominated by oil and oil products and capital goods. Imports of materials for assembly and embroidery have grown rapidly. The balance of trade in fish and fish products (excluding fish meal) was adverse until 1977 and significantly favourable (over 10 percent - in absolute terms - of the overall trade balance) after 1984.

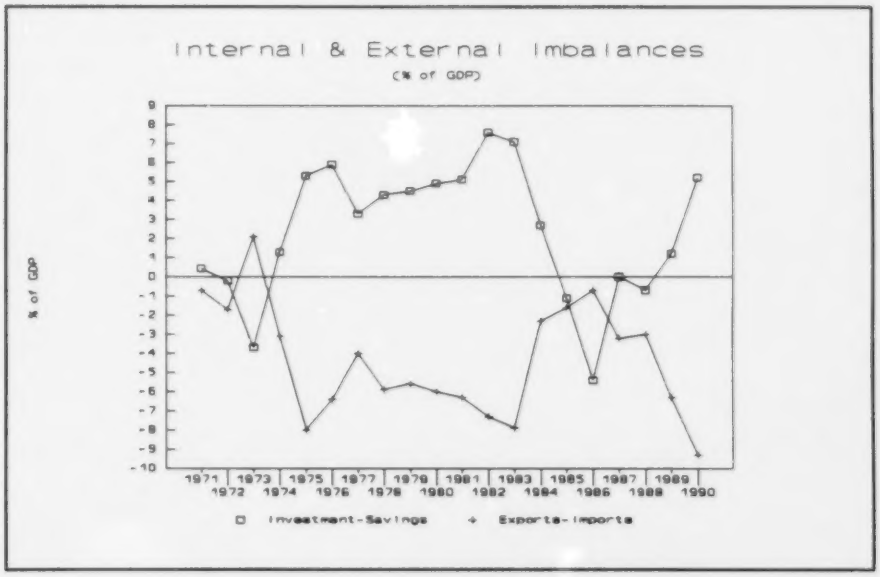
Merchandise terms of trade deteriorated by over 50 percent between 1971 and 1983 as a result of the oil price increases of the 1970s and generally falling prices for agricultural commodities. Despite this, export volumes more than doubled and import volumes continued to increase on the strength of substantial commercial borrowings.

The exchange rate was managed in conjunction with this trade regime. From a rate of P6.48 to the US$1.00 in 1971, the rate was devalued to P8.60 in 1982 and to P11.19 in 1983. These devaluations were far less than changes in relative prices would indicate. The real rate of exchange appreciated and the competitiveness of the Philippines deteriorated.

The push for industrialisation was sustained by borrowing abroad, both officially and on commercial terms. Borrowing, already substantial in the early 1970s, increased markedly as oil prices increased. Most borrowing was public and publicly guaranteed debt. By 1983 debt outstanding was equivalent to three years of exports and debt servicing was 36 percent of exports.

Growth in GDP alone suggests that the Philippines economy performed satisfactorily through-out the 1970s and into the early 1980s. An educated and relatively well skilled workforce, abundant natural resources and an apparently dynamic local entrepreneurial group led many to see the Philippines as a potential South East Asian dragon. Such a view overlooked the shaky foundations of much of the "progress" of the 1970s and the weaknesses in policy making. These were exposed by the second oil price shock and collapse in prices for primary commodities [Jayasuriya]. The Philippines demand for external credit increased just as the supply decreased, forcing the Government to turn to the IMF and the World Bank.

FIGURE VII 3



Source: Table VII 1

2 STRUCTURAL ADJUSTMENT POLICIES AND THE MACROECONOMIC IMPACTS

The IMF imposed an exchange rate devaluation on the Philippines in 1970 which, in retrospect, can be seen as a prelude to the storms of the 1980s.

2.1 SAP Measures: "Weak", "Classic" and "Never Say Sorry"

The IMF and the World Bank have, to varying degrees, influenced Philippines economic policy since the first US$200 million SAP loan in 1979/80. Since then there have been:

- in 1983/84, a $US 302 million SAP loan and a $US 150 million Sector Adjustment Loan (SECAL) for agricultural inputs;

- in 1986/87, a $US 300 million Sector Adjustment Loan for economic recovery;
- in 1989, a $US 500 million Sector Adjustment Loan for economic recovery.

In addition the Philippines has drawn around $US 1 billion from the IMF throughout the 1980's.

The 1979/80 Bank loan conditions sought to liberalise tariffs, trade restrictions and interest rates. "Classic" IMF and World Bank conditions were attached to the 1983/84 and 1986/87 SAPs and SECALs. They included:

- cuts in Government expenditures (although not specifically directed to jobs as, the Bank believes, "the Government bureaucracy remains small" [World Bank, 1990] a view refuted by a visit to any Government department);
- increases in Government revenues ("the most striking feature of the (tax) system is the country's very low tax burden" [World Bank, 1988 p. 22]);
- re-structuring and privatising public corporations and ending Government direct investment in capital intensive projects;
- further liberalisation of interest rates, tariffs, trade policies, the exchange rate and the prices of agricultural inputs and outputs;
- tight monetary and credit policies.

The immediate benefits from adopting these measures were to come from some relief in external debt obligations and, over a ten year period, from a Comprehensive Agrarian Reform Programme which transferred, on highly concessional terms, 10.3 million hectares of farm land to 3.6 million tenant and landless farmers.

By 1988 it became clear (if not acknowledged) that the 1983/84 and 1986/87 measures had, in effect, "corrected" the external imbalance by worsening the internal imbalance (see Figure VII 2). "After three years of strong growth, the Philippines economy is entering a critical phase. In the absence of policy changes a reversal in performance is a distinct possibility. Its origin is the significant rise in domestic debt and debt servicing costs that has accompanied the adjustment effort." [World Bank, 1990 p. 35]

The prescription of the 1989/90 SAP - negotiated in March 1989 and revised in December 1989 - was more of the same. "The programme gives top priority to fiscal adjustment (both raising revenues and cutting expenditures).... and complementary monetary and exchange rate policies. In addition measures have been proposed to reduce interest rates." [World Bank, 1990, p. 23]

2.2 Macro Economic Impacts of SAP Measures

The macro impacts of these adjustment programs were diffused by politics and subsequent events.

For example in 1981 and 1982, a series of important trade policy reforms were implemented as part of the conditions of the first loan in 1979/80, but the process was interrupted by the crisis that followed the assassination of Benigno Aquino in 1983.

Although measures to reduce tariffs on final goods are politically sensitive and have still to pass Congress [Jayasuriya 1990, p. 17], SAPs have been effective in liberalizing trade. The conditions of the 1983/84 SAP allowed temporary new surcharges on imports (3 percent in December 1983, 10 percent in June 1984 and 5 percent early in 1985), but pressure for trade liberalisation was sustained and by the end of 1985, substantial changes in the trade regime had been achieved. Between 1980 and 1986 effective protection rates were halved, the number of "banned" items fell from 1,038 to 193, and the number of "regulated" items fell to 675 from about 1,500. The conditions of the 1986/87 loan - negotiated with the Aquino government - continued this thrust. Between 1986 and mid-1988 1,230 items, many of them raw materials and intermediate inputs, were deregulated.

The 1979/80 measures had little impact on interest rates; the 91 day Treasury bill rate rose from an average rate of 12.2 percent during 1979 to an average of 14.5 percent in 1983. However, subsequent measures led to an increase of Treasury bill rates to 37 percent in 1984 and 27 percent in 1985. Interest rates dropped in 1986 and 1987, but climbed back to almost 25 percent by 1990.

The impacts of measures to restrain demand were immediate and severe. GDP was 9 percent lower in 1984 than in 1983 and fell a further 7 percent in 1985. GDP per capita, already declining from its 1980 peak, fell 20 percent in two years, returning incomes to levels of the 1970s. GDP recovered to its 1983 level by 1988 and grew 5 percent in 1989, but growth slowed in 1989 and has perhaps ceased in 1990 and 1991.

Unemployment increased from four to five or six percent between 1980 and the mid 1980s, and peaked at 11.2 percent in 1987. This was partially the result of the increased participation rates which had the effect of adding 4.5 million people to the labour force.

Exchange rate devaluations of 25 percent in 1983, 50 percent in 1984 and 12 percent in 1985, reductions in subsidies on power and fuel oil, and increases in minimum wages, all had dramatic impacts on prices. The all Philippines CPI rose 50 percent in 1984 and a further 23 percent in 1985. Inflation slowed dramatically in 1986, but had crept back up to over 10 percent per annum by 1989.

The National Government's budget deficit fell between 1982 and 1983 as expenditure was contained and revenues increased. There-after increases in revenues (substantial in 1987) were usually matched by increases in expenditures. While the Government and IMF agreed to continue deficit inducing expenditures on infrastructure, annual typhoons, a severe drought in 1989/90, an earthquake in July 1990 and the Mt Pinatabo disaster in 1991 imposed heavy additional demands on Government funds. As a result, the government deficit remains at high levels.

The internal (investment/saving) imbalance, dramatically reversed in 1985 through 1988 (a consequence of depressed demand, high interest rates and financial sector re-structuring), re-emerged in 1989 and 1990 as economic activity picked up. The external (import/export) imbalance followed a similar pattern, the deficit falling to less than 1 percent of GDP in 1986 before ballooning to $US 4.0 billion, over 9 percent of GDP, in 1990. As external debt had been re-structured as part of the Bank's adjustment process, servicing external debt did not become more onerous. Pressure for "broadening the scope and deepening the intensity of structural adjustment reform efforts" [World Bank, 1990, p. (i)] came from "the significant rise in domestic debt and domestic debt servicing costs that has accompanied the adjustment effort" [World Bank, 1990, p. 35].

The Bank appears to be tying further disbursements to the government's success in increasing its revenues and reducing its deficit. The Manila Bulletin of November 2nd 1991 headlined the Government's need for P18.7 billion in new revenues to get the consolidated public sector deficit below the limit (of P43.2 billion) agreed with the IMF. Other aid is tied to "counterpart" funds from the Government - funds which the Government appears not to have. The Manila Bulletin of October 30th reported that "Billions of pesos of foreign assisted projects, including some of the Aquino government's top 10 priority projects, will be jeopardised if new revenues of P18.75 billion are not raised in 1992". The Finance Secretary was quoted as saying that the 1992 budget sets aside only P3.76 billion for counterpart funds. These pressures may restrain Government expenditures on major projects, but not on responses to natural disasters. However, the IMF has agreed that the expenditures made as a result of natural disasters will not count against conditionality criteria.

This concession recognises reality - but not the reality that the SAP measures followed (to some extent) since 1979 have not altered the structure of the Philippines economy. While the impacts of many parts of the SAP medium term plan are still working through the system, the more controversial plans remain to be implemented. It is not clear however, that "broadening the scope and deepening the intensity of structural adjustment reform efforts" will be more successful.

3 FISHERIES IN THE PHILIPPINES

The fisheries sector in the Philippines accounts for about 5 percent of GDP and provides employment for over one million people or about 5 percent of the work force. Exports of shrimps, prawns and tuna contribute significantly to the trade balance. But perhaps the most important role of the sector is as a provider of food and income, especially for those in the fishing villages along its thousands of kilometres of coastline, who are engaged in "municipal" marine fishing. A marine fisherman (there are no women on the boats, continuing the

seafaring belief that "women are bad luck " on boats) is classified as municipal if he fishes without a boat, or with a boat with a capacity of less than 3 gross tonnes (GT), and in waters up to 7 km offshore. Others, of similar social status, who raise fish in rivers, ponds and lakes, are engaged in municipal inland fishing. Commercial fishermen use boats with a capacity of over 3 GT and (are meant to) fish more than 7 km offshore. The commercial counterpart to municipal inland fishing - raising prawns, shrimp and various fish in both freshwater and brackish water ponds -is classified as aquaculture. Marine aquaculture (mariculture or sea farming) of seaweed, oysters and mussels is also practised. Figure VII 4 shows the fisheries areas of the Philippines.

The commercial catch is landed at major ports; about 30 percent at the Navotas Fish Port in Metro Manila and at other major ports (e.g. Cebu) and the large southern island of Mindanao. From here fish goes, through myriad channels, to fresh fish markets, to processors (mainly canners), and for export - primarily to the premium sushi and sashami markets of Japan. Municipal marine catches are either sold at local markets or, if the infrastructure is adequate, transported to the Malabon market in Manila. While municipal fishing is practised in all regions, the catch is not evenly distributed on a per capita basis (see Table VII 3).

Some (aqua and mari) cultured products are marketed through Navotas and other markets, although product specific marketing and distribution channels, with local representatives of final users buying locally, are emerging. Many of the ports, and much of the infrastructure in the marketing and distribution chain - ice making plants, freezer capacity and road links - are decrepit and overextended. Various Bank and other foreign aid programs have and continue to attempt to improve this situation.

3.1 Fish as Food

Fish is an important source of animal protein for many in the Philippines. In 1974-76 fish provided 22.6 percent of all protein consumed and 62 percent of animal protein [Kent, 1987, pp. 65-71]. Since this time fish has become more expensive relative to other forms of animal protein. As own price elasticities are negative (and decreasing as income increases) [Regaldo and Gonzales, 1987, p. 57], the relative increase in fish prices since 1976 may have reduced consumption of fish. Data from three national surveys of nutrition confirm this hypothesis (Table VII 4). Population growth averaged in excess of 2.5 percent per annum over this period, however, so that <u>total</u> fish consumption increased steadily.

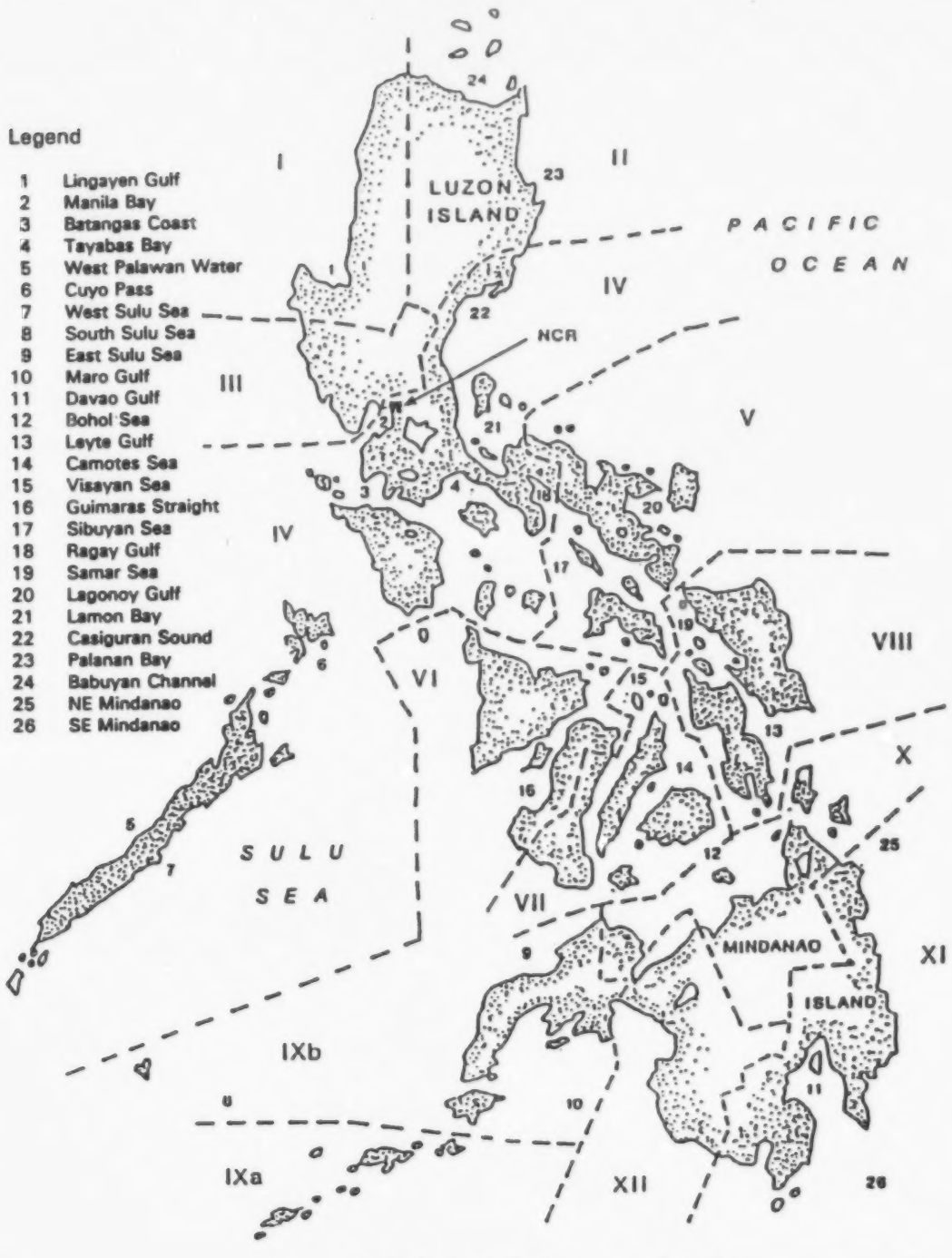
Table VII 3 Municipal Landings and Population, By Region

	Region	Fish landed[1] '000 tonnes	Population[2] '000s	Fish landed per head kg/head
	NCR	7	7,561	0.98
I	Ilocos	13	4,134	3.06
II	Cagayan Valley	8	2,713	2.86
III	Central Luzon	17	5,863	2.93
IV	South Tagalog	128	7,692	16.68
V	Bicol	83	4,198	19.77
VI	Western Visayas	140	5,439	25.81
VII	Central Visayas	26	4,446	5.89
VIII	Eastern Visayas	35	3,243	10.65
IX	Western Mindanao	192	3,061	62.65
X	Northern Mindanao	68	3,438	19.71
XI	Southern Mindanao	40	4,132	9.69
XII	Central Mindanao	20	2,802	7.29
		777	58,722	13.24

[1] average annual landings 1982 - 1987
[2] projected (moderate declines in fertility & mortality)

Sources: fish landings: Agrodev, Table 7
population: National Statistics Office, Philippine Year Book 1

Figure VII 4 Statistical Fishing Areas of the Philippines



There are no official studies of the pattern of utilization of fish caught so per capita consumption may only be estimated. Drawing on various studies, Agrodev [1988, p.53] suggest that 83 percent of production is consumed in the Philippines (67 percent as fresh, 8 percent dried, and 8 percent processed). A 1987 survey indicated that annual per capita consumption was 40 kgs of fish, 52 percent of all consumption of animal protein sources. Population in 1987 was estimated at 57.4 million people who would consume, at an average of 40 kgs each, a total of 2.3 million tonnes of fish. Given that total production for 1987 was only 2.2 million tonnes and net exports were over 35,000 tonnes, it appears that 40 kgs may overstate consumption.

Table VII 4 Fish and shellfish consumption (as purchased form)

	1978	1982	1987
	(kg per capita per year)		
all consumers			
fresh	29.2	32.0	32.0
dried and processed	8.1	8.0	8.0
% animal protein	58.8%	56.4%	55.6%
all urban			
fresh	35.8	34.0	34.0
dried and processed	6.6	8.0	8.0
% animal protein	49.0%	45.6%	47.1%
all rural			
fresh	25.9	38.0	31.0
dried and processed	8.8	8.0	9.0
% animal protein	66.6%	59.9%	52.1%
among small/hired fishermen			
fresh	41.2	38.3	54.4
dried and processed	7.3	8.4	8.0
% animal protein	83.6%	63.7%	81.4%
among commercial fishermen			
fresh			33.9
dried and processed			11.3
% animal protein			73.8%

Source: National Science Development Board
(Food & Nutrition Research Institute
Nationwide Nutrition Surveys

Some of the difference may be due to under-recording own (subsistence) consumption in municipal fishing. A study by Japan International Co-operation Agency estimates consumption at 33 kg per head in 1988 while the FAO's food balance sheet for 1982-84 shows average annual per capita consumption to be 35.7 kg [Agrodev 1988, p. 53]. If consumption per head is taken at 33 kg, production in 1988 is "overstated" by 288,000 tonnes. A lot of this may be (non-edible) seaweed which is included in the aquaculture figures.

Total fisheries sector production has increased each year since the 1950s, except for 1983-86 which were years of political upheaval and IMF austerity. Although municipal fisheries still contribute the biggest bulk of fish production, the contributions of the various sectors have changed because aquaculture and commercial production have grown faster than municipal production (Table VII 5). This uneven growth indicates that particular attention is paid to technology improvement in aquaculture (including seaweed farming), the expansion of commercial fisheries (especially pelagic fisheries) within and outside the country, and the declining fish stocks in municipal waters.

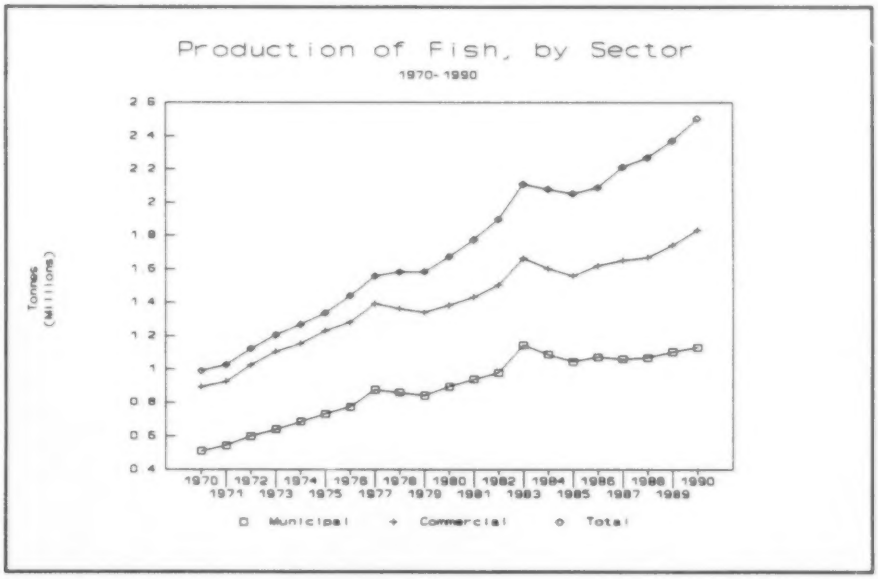
Data for commercial fishing and for aquaculture are relatively easy to collect and are therefore likely to be more accurate than data for municipal fisheries which is compiled from reports from hundreds of landing/weighting stations throughout the country. Data for municipal fisheries excludes for own consumption.[1]

Table VII 5 Fish Production by Subsector, 1981 - 1990, in '000 Mt and Million Pesos

	Total		Commercial		Municipal				Aquaculture	
					Inland		Marine			
Year	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1981	1,773	13,954	495	4,125	229	700	710	6,254	339	2,865
1982	1,896	15,064	426	4,355	270	828	708	6,488	392	3,393
1983	2,110	18,982	519	4,643	375	2,077	771	7,463	445	4,799
1984	2,080	25,650	513	6,521	299	1,572	790	10,291	478	7,266
1985	2,052	31,297	512	7,857	260	1,920	785	12,796	495	8,724
1986	2,089	37,331	546	9,248	265	2,640	807	14,611	471	10,832
1987	2,213	37,243	591	9,821	245	1,891	816	14,217	561	11,314
1988	2,269	42,110	600	10,272	232	1,940	838	14,693	599	15,213
1989	2,371	45,094	637	11,033	222	2,206	883	16,182	629	15,673
1990	2,504	52,178	701	12,411	237	2,564	895	16,736	671	20,467
AVERAGE	2,136	31,891	564	8,029	263	1,834	800	11,974	508	10,055
% SHARE	100.00	100.00	26.41	25.18	12.33	5.75	37.47	37.55	23.79	31.53
GROWTH RATE 1980-1990	4.0	15.8	3.9	13.0	0.4	2.1	2.6	12.0	7.9	24.4

Source: Bureau of Agricultural Statistics

FIGURE VII 5 Production of Fish By Sector 1970 - 1990



Source: Bureau of Agricultural Statistics

1 The Under Secretary for Fisheries does not believe the production figures; if per capita consumption is 40 kg per annum, he talks of a shortfall in fish for consumption of 800,000 tonnes by 1995.

3.2 Productivity and Investment in Fishing

Production may be increasing because more effort - more fishermen fishing more days; more boats fishing longer hours; gear (net types and mesh sizes) that catch more fish for the same effort etc - is being put into fishing. There are no data on catch per unit effort (CPUE), but using Agrodev's elaborate calculations of fuel used [p.46] and area of aquaculture ponds as measures of inputs, productivity has been declining in municipal and commercial fishing (Table VII 6).

The rise in productivity in aquaculture may be more apparent than real as the area of ponds may not be a good measure of inputs. Fish meal would be better (but data are not available); it is generally recognized that fish in ponds (in the Philippines) consume rather than produce fish!

Table VII 6 Estimates of Productivity

	Unit	1971	1977	1985
municipal fishing				
catch	000 tonnes	543	875	1,045
fuel used	mn gallons	22	53	133
productivity	kg/gal	25	16	8
commercial fishing				
catch	000 tonnes	382	518	512
fuel used	mn gallons	29	29	44
productivity	kg/gal	13	18	12
aquaculture				
catch	000 tonnes	98	164	495
area of ponds	000 h.a.	168	176	205
productivity	kg/ha	584	928	2,418

Sources: catch: Table VII 4
fuel used: Agrodev p46
areas: BFAR statistics, various year

3.2.1 Investment in Municipal Marine and Inland Fishing

The major investment required for municipal fishing is in a boat (called a banca) and in gear. A banca, a marine ply keel with outrigger stabilisers, may be from three to five metres long, or up to nine metres if powered by a 6 to 16 HP gasoline engine. Over 40 percent of all bancas are motorised. A motorised banca with gear costs, in 1991, between P20,000 [Figures in Smith & Mines inflated by the CPI] and P55,000[2]. The number of bancas increased by almost 100,000 between 1980 and 1985 and by a further 30,000 - 50,000 (our estimate) between 1985 and 1990:

Table VII 7 Number of Bancas 1971 - 1990

	Non motorised	Motorised	% motorised
1971	129,793	59,875	32%
1980	262,748	105,090	29%
1985	270,419	193,976	42%

Source: 1971: Dalzell et al
1980 - 1985: BFAR

2 Discussions with H. Celeste, Chairperson, Bolinao Fisheries and Fish Dealers Association.

Motorization (aided by a World Bank programme in the mid 1970s) has had three major implications:

- it has increased the time spent actually fishing (instead of travelling to and from the fishing site) and it allows boats of all sizes to use nets, which are more efficient than gears used traditionally;
- it linked municipal marine fishermen more firmly into the market economy, particularly for directly (fuel, engines) or indirectly (polyester for nets) imported inputs;
- it has increased the dependence on suppliers of credit for more expensive gear and for fuel;
- it has allowed fishermen to go outside their traditional areas where conservation may have been self-policed, and into the areas of others (i.e. it encouraged "open access" in all fishing areas).

There are no data describing ownership of bancas, but some inferences can be made. The ICLARM study of gill netters in San Miguel Bay reports that "of the 20, 11 were owner operated" [Smith & Mines, p. 37]. Discussions with the Chairperson of the Fisheries & Fish Dealers Association (BOFFIDA) in Bolinao suggested a similar proportion. Non-owner operators in Bolinao were fish buyers/dealers. The interests of fishermen and fish buyers are not considered as antagonistic as evidenced by their joint organization BOFFIDA who, in addition to owning and funding bancas, funds fishing trips.

Capital may come from outside the industry as public credit schemes are notorious. The Development Bank of the Philippines Small Foreshore and River Fishermen Program loaned P245 million over three years from 1975. Nationwide, less than 1 percent of these loans were paid off [Smith & Mines, 1982, p. 15]. A subsequent program (*Biyayang Dagat)*, and the World Bank scheme for purchase of engines had similar repayment rates. This free capital appears to have substantially increased fishing capacity without any regard to fish stocks, the ability of the industry to replace this capital, or the distribution of benefits. The view (and caveat) of Smith and Mines can be applied more widely:

> "Although there are no hard data to substantiate it, it appears that the expansion in fishing power ... has been substantial. Because these units are now wearing out ... the economics that fishermen face today are quite different from the economics that prevailed (when the loan schemes were introduced.)" [op cit, p. 15]

Over the last decade, and probably for much longer, fishing methods used by municipal fishermen have not changed much. Both motorized and non-motorized bancas' use hook and line and gill nets; the motorized bancas use gill nets, bag nets, ring nets, and various seines. In terms of contributions to catch, the most important type of gear are gill nets, which accounted for 30 percent of municipal catch in 1986, followed by hook and line which accounted for 28 percent [Agrodev, 1988, p. 38].

Inland municipal fishermen capture fish, crustaceans (primarily shrimps) and mulluscs (clams and snails) in rivers, lakes, reservoirs and freshwater marshes. Production has declined from a peak in 1983 to around 240,000 tonnes in 1990. While the area under ponds has increased, these are used for aquaculture.

3.2.2 Investment in Municipal Inland Fishing and Aquaculture

Aquaculturists or fishfarmers raise fish, crustaceans, seaweeds and mulluscs in pens, cages, rafts, bamboo poles, and other structures in open waters (marine bays, rivers, lakes, reservoirs) and in fresh and brackishwater fishponds. Production has steadily increased from the mid 1970s to 671,000 tonnes in 1990. Forty-three percent of total aquaculture production is seaweed, 31 percent is milkfish, and 12 percent is tilapia. Although shrimp production was only 8 percent of total aquaculture production, the export market for prawns spurred significant investments in the intensive and semi-intensive culture of tiger prawns in brackishwater ponds in the 1980s.

There are no data on ownership of the substantial investment required. Simple fish pond cost about P150,000 per hectare to develop, while the concrete ponds and powered pumps for prawn growing cost millions of pesos. Based on the pond areas given above, and on average costs of P500,000 per hectare, investment in fish ponds may be estimated at:

- between 1971 and 1977, P2.6 billion;
- between 1977 and 1985, P8.5 billion.

Many of the ponds used in aquaculture and marine inland fishing have been cut in mangroves (whose importance for marine fishing is discussed below); others have taken land from agriculture. On the island of Negros, ponds have replaced sugar cane, itself an export crop.

3.2.3 Investment in Commercial Fishing

Commercial fishing boats have a capacity of over three GT and (supposedly) fish less than 7 kilometres (soon to be 15 kilometres) from shore. Development of the fleet is a post World War II phenomenon when wooden boats were built in the Philippines. Since the 1970s, under pressure from Japanese and Taiwanese fleets, larger and larger second- hand boats were imported and with them improved gear. The size and composition of the fleet in 1986 is shown in Table VII 8.

BFAR figures put the fleet's total capacity in 1989 at 152,800 GT. If an extra 1,000 vessels, nearly doubling the gross tonnage, were added in three years, stories of difficulties of investing are as believable as many fish tales.

The larger vessels have extended the areas fished even beyond the Philippines EEZ. In mid 1988 seven Philippine tuna purse seiners fished the waters of Papua New Guinea and others are known to fish in waters claimed by Malaysia and Borneo. All this fish is landed in the Philippines and counted as local production.

Table VII 8 Commercial Fishing Fleet 1986

Size of vessel	No.	Total capacity (G.T.)	% of no.	% of capacity
3 - 19 tonnes	1318	13,411	58	16
20 - 99 tonnes	794	35,189	35	42
100 - 199 tonnes	118	15,403	5	18
> 200 tonnes	53	19,504	2	23
	2,283	83,507	100	100

Source: Agrodev (from BFAR) p. 40

3.3 Employment, Income and Returns

In broad terms, fisheries in the Philippines account for 5 percent of income (GDP) and 5 percent of employment. Data by sector are harder to come by.

3.3.1 Municipal Fisheries

About one million people derive their livelihood from municipal fishing [Agrodev, 1988, p. 65]. For most, fishing is seasonal because of the weather and the species availability, but not all are able to find alternative sources of income during the off season. In Zumarraga, male household members earn income from retail trade, basket weaving and seasonal manual labour [BAS/BFAR, 1989, Table 8]. In Castillo, gill netters "had no alternative occupation during non-fishing (forced idle) days. .. when they ran out of money ..they asked boat owners for loans .. to be repaid from future catches." [Smith & Mines, 1982, p. 31]. Generally, returns to municipal fishermen are poor; some estimate that almost 40 percent of fishing families have incomes below the poverty line [Agrodev, 1988, p. 65].

While total production is rising, catches per boat are declining. Tables VII 5 and VII 6 suggest a fall per banca of 21 percent between 1971 and 1985. Agrodev relate "rapidly declining catch rates (in some fishing regions) between 1977 and 1986" [p. 65]. Bolinao fishermen told of current catches of 100 kg of fish in a three day trip, about half of what they caught 5 years ago, suggesting the decline continues.

Costs and earnings vary by type of gear and boat. Table VII 9 shows estimates of the gross returns and expenses of municipal fishing enterprises from two studies and as estimated by a fish dealer/boat owner.

The divergence of returns to crew and boat shown in the three estimates is due to divergence in catches (there are large differences between the regions in average catch per fisherman) [Table VII 4 and Agrodev, 1988, Appendix 6 Table 6.5] and in quality of data collection. It may also reflect a (relatively) increasing subsidy on the price of gasoline between 1981 and 1987 when the retail price of premium gas rose 43 percent and the CPI by 134 percent. The landed prices of fish in Bolinao were raised in 1991 to allow for increases in gas prices - producing rough comparability with returns in Castillo in 1981.

Table VII 9 Costs and returns from municipal fishing

	Bolinao[1]		Castillo[2]		Zummarraga[3]	
	P/trip	%	P/annum	%	P/annum	%
gross returns	2,000	100%	32,917	100%	4,200	100%
gas/oil	800	40%	11,985	36%	634	15%
ice	25	1%	--	--	28	1%
food	10	1%	2,899	9%	199	5%
other expenses	15	1%	2,076	6%	140	3%
	850	43%	16,960	52%	1,001	24%
return to crew/ boat	1,150	58%	15,957	48%	3,199	76%

Sources: [1] discussion with H. Celeste, Chairperson BOFFIDA
[2] Smith & Mines
[3] BAS/BFAR

A fisherman's income depends upon how net income (gross returns minus variable costs) is shared between the owner of the boat, the owner of the gear (who may be different from the owner of the boat), and the fishermen. There is some uncertainty as to how the system works in practice. In Bolinao it is widely believed that the boat is counted as one person and the net return divided equally. With a three man crew this works out to P288 for a three day trip, about P1,800 a month per crew man. Fishermen in Bolinao, however, reported the share as 50 percent to the boat with the balance equally among the crew. This implies that each member of the crew earns P190 per trip. In Castillo gill netters used a similar fifty/fifty system, but some owners give an incentive (from their share) to the boat's pilot. Where the owner fishes, he shares as owner and as crew. In all systems, a little of the catch is shared for own consumption.

A share in the catch is not the only source of return to the owner. Boat owners are often also fish dealers, truck owners, fuel suppliers and banca bankers; and each of these occupations allows a "turn". For example, fuel purchased on credit might be paid for by selling all the catch to the supplier at 10 percent below market price; this can imply interest rates of 30 percent per day [Smith & Mines, 1982, p. 35]. As a dealer/transporter, an owner in Bolinao can gross P15 per kilo of fish transported to and sold at Malabon. And a local "banker" can earn 6 percent per month! Apparently these rates are set by the local, not national, economies and change little over time.

3.3.2 Seaweed Farming

One of the fastest growing segments of aquaculture is *mariculture*; the farming of seaweed (for carrageenans, used in the food processing industry) oysters and green mussels and so on in coastal waters. Production of seaweed has grown from 169,000 tonnes in 1986 to nearly 300,000 tonnes in 1990. Production of oysters declined slightly in this period while production of mussels rose slightly.

The appeal of seaweed production is its potential for good returns (see Table VII 10). The costs of a farm are small relative to the return. Fishing line (imported monofilament) is stretched between poles driven into the seabed. The seaweed seedlings and soft plastic ties (for tying the seaweed to the lines) are a substantial outlay. The seaweed is harvested after two to three months. The seaweeds (there are two main varieties) are dried and exported through processors (powdering), some of whom have local agents for buying and transportation. A substantial amount is exported unprocessed. Trono says "The price of dried seaweed ..(is) influenced by the demand in the international market. (The price of) variety A is pegged at P12/kg while variety B is P10/kg delivered to Cebu. Farm gate price for the former is about P7/kg while P10/kg for the latter." [Trono, 1991, p. 3].

Table VII 10 Costs & Returns to Seaweed Production

Set up/fixed costs	P/h.a.	Variable costs	P/h.a.
mangrove stakes	600	labour @ P50/day	62,400
plastic ties	900	other	3,000
tools/baskets	1,430		
banca (small)	1,500		65,400
monofilament line	3,200	sales (6 crops p.a.)	
drying platform	3,800	each crop 3,700 kgs (dry)	
seedlings (1st yr only)	24,000	@ P7/kg = 25,900	
	35,430	x 6 =	155,400
Margin: sales minus variable costs		90,000	
Margin: times fixed costs covered		3	

Source: Trono, p. 25

Fixed and variable costs are kept low by using household labour and because there is generally not a need to invest in a motorized banca to get to and from the farm. The potential for surplus is substantial, allowing capital for a bigger farm to be accumulated from smaller farms. A specialist in the area (Trono) relates how seaweed farming has changed the community on Roxhas (Green Island.) Before seaweed farming was introduced 10 years ago, Green Island was a fishing outpost for the local (municipal marine) fishing village. Now the island is covered with houses which sprout TV antenna - although there is no power supply to the area.[3] Further, the seaweed farmers do not fish themselves but buy from others.

3.3.3 Commercial (offshore) Fishing

There are over 3,000 boats in the commercial fishing fleet which caught over 700,000 tonnes of fish in 1990. The major species were scad (33 percent of the catch) and tuna (about 25 percent). Both are consumed in the domestic market, but tuna is also exported fresh and canned for export. The tuna industry has been studied for the fishery sector program: the following draws on that study (Philippine Tuna Sector Study Hardy International Inc.). Tuna fishing was conducted primarily by municipal fishermen until the early 1970s, when enterprising fishing companies adapted modern seine and ring net methods to capture large schools of tuna aggregated by *payao* (a fish aggregating device). In two years a number of buying companies were formed and cold storage

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3 The TV sets are run from batteries.

plants constructed. The sector expanded rapidly until the early 1980s and has been relatively stagnant since then. The major reasons for this are:

- the decline in catch per unit effort due to a decline in fish stocks and in average fish sizes;
- the aging of the fleet and its unsuitability for the limits (and beyond) of the Philippines EEZ.

This slowdown in supply (a supply which at best is seasonal) adversely affected profitability of canneries and they have lost markets to the more efficient fleets and processors of Thailand. Despite this, two new tuna canning companies are scheduled to open in 1991, bringing the total industry capacity to approximately 190,000 tonnes. With domestic landings steady at about 75,000 tonnes and the landings of the distant water fleet (outside the Philippines EEZ) at 50,000 tonnes, it is likely that 65,000 tonnes of tuna will have to be imported each year.

There are no data on canners' financial positions. One study notes "a generally gloomy picture of the sector emerged during interviews" [RDA, 1990, p. 27]. Some of that gloom is now blamed on high domestic interest rates. But over-capitalization is also listed as a cause of gloom, and it can be argued that the low and negative real interest rates prior to financial adjustment encouraged this over-capitalization.

There are no studies drawing on detailed information from fishermen or fishing fleet operators. The one cost and earning study that we did find presented only "stylized" data [RDA, 1990]. These figures are presented in Table VII 11.

These figures show:

- the commercial tuna fleet produces gross revenues of about P2.9 billion per annum with net revenue to owners of roughly P0.36 billion, or about 12 percent of gross revenue;
- hand liners and bag netters (mostly bancas and so not strictly part of the commercial fishing fleet) are the most numerous and the most profitable, yielding returns of close to 30 percent on capital costs (which are 7 times those quoted to the author);
- 18 large (450 - 750 GT) purse seiners fishing at the edge or beyond Philippines' EEZ catch almost as much tuna as the bancas, but yield a far lower return on capital;
- other boats in the fleet are not profitable at current capital costs and interest rates.

Table VII 11 Stylized Revenues & Returns of the Tuna Fishing Fleet

	Capital cost (P mn)	# of boats	Gross revenue (P mn)	Net revenue (P mn)	Boats %	% of gross revenue	% of net revenue
Type of vessel							
handliner	0.4	1,500	1,125	171	86	38	47
bag net	0.4	100	80	13	6	3	4
purse seiners							
: small	4.3	80	320	8	5	11	2
: medium	6.4	50	394	18	3	13	5
: large	210	18	1,026	155	1	35	42
Total		1,748	2,945	3 65	100	100	100

Source: RDA, 1990.

One factor underlying these relatively poor returns is the decline in productivity (CPUE) in past 5 to 10 years. The apparent "success" of the large purse seiners underscores this as they are profitable only because they fish the relatively unexploited waters beyond the Philippines' EEZ.

Another determinant of profitability is price - whether in the domestic (fresh dried or fish sauce) market; canning for domestic consumption; canning for export; or the premium sashmimi market. As demonstrated in Table VII 12, ex-vessel prices are lower the further the port of landing from Manila.

At the prices shown in Table VII 10, sashmimi shippers realizes a profit of P10 per kg [RDA, 1990, p. 36]. They use about one-third (60,000 tonnes) of tuna caught locally while the remainder supplies about one-half of the weight of whole tuna canned. At the sales price quoted by local canners (US$22 per case), canners are loosing money. Because of competition from Thailand, they are paying world prices for both locally caught and imported tuna. Their labour costs are on par with Thailand and "they have a competitive advantage .... in that 75 percent of their raw product comes from their local fleet, while the Thai's import all their tuna" [RDA, 1990, p. 39]. Both the Philippines and Thailand must import all the tin plate and cans they require.

TABLE VII 12 1990 Average Ex-Vessel Tuna Prices (Pesos per kg)

	Mindanao	Navotas
Skipjack		
300-500 gm	7.50	10.00
0.5-1.0 kg	10.00	20.00
1.1-1.8 kg	11.00	14.00
> 1.9 kg	12.75	18.20
Yellowfin		
0.3-1.0 kg	11.00	20.00
1.1-1.8 kg	13.00	20.00
1.9-20 kg	18.00	22.40
> 20 kg sashimi	100.00	100.00
domestic	18.00	20.00
Bonito		
under 300 gm	6.00	10.00
over 300 gm	7.50	11.20

Source: RDA, 1990, p. 30

3.4 Fish in External Trade

The Philippines both exports and imports fish and fish products but overall it is a net exporter. Exports in 1990 were valued at almost US $500 million, up from $166 million in 1980. Fish now accounts for 6.1 percent of total merchandise exports compared with only 2.9 percent in 1980. Exports of shrimps/prawns to Japan account for US $176 million (38 percent) of the total. Over 40 percent of all fish exports go to Japan. Table VII 13 shows how the composition of exports has changed over the years.

Table VII 13 Fish Exports

	1980		1985		1990	
Species	P mn	%	P mn	%	P mn	%
tuna	491	39%	1,132	32%	2,861	25%
shrimps/prawns	154	12%	1,177	34%	5,436	47%
seaweed	55	4%	382	11%	1,192	10%
other	551	44%	805	23%	2,040	18%
	1,251	100%	3,496	100%	11,529	100%

Source: BFAR, various years

Exports of shrimps rose from 2,000 tonnes in 1980 to 15,000 tonnes in 1987 but have recently declined slightly. Their importance in terms of value is even more pronounced. Exports of chilled and frozen tuna fell from 47,000 tonnes in 1980 to 11,000 tonnes in 1987, a decline that was not offset by the slight rise in exports of canned tuna from 18,000 to 26,000 in 1987. Fluctuations by value are even more marked, reflecting the volatility of tuna prices.

The Philippines imports fresh tuna to keep the canning industry going during the offseason in its own tuna fishery), and as well as canned fish and fishmeal. The importance of the latter has grown with aquaculture has grown (Table VII 14).

Table VII 14 Fish Imports

Species	1980 P mn	1980 %	1985 P mn	1985 %	1990 P mn	1990 %
fishmeal	197	72%	5	4%	1,092	59%
canned	-	-	-	-	639	34%
fresh/frozen fish	77	28%	113	96%	92	5%
other	0	0%	0	0%	31	2%
	274	100%	118	100%	1,854	100%

Source: 1990 BFAR; other years Agrodev

Table VII 15 Foreign Exchange Balance Sheet for the Philippine Fishing Industry

Description/Activity	Items covered	Imports (average/year in $000)	Exports
Marine fishing, total	fishing vessels, nets, equipment, etc.	36,000	90,000
Tuna canning and other fish processing	raw fish, tin plates, other inputs	3,000	67,000
aquaculture	feed, equipment, etc.	3,000	154,000
		42,000	310,000

Source: Agrodev (appendix 14, p 15)

The restrictions on imports after the SAP program account for the fall in fishmeal imports in 1985. "Trade liberalization" was a major factor in the rise to 1990 levels.

Fishing boats, fishing gear and equipment used in aquaculture, polyester for net making, and tin plate for canning are the major items imported directly for use in the fishing sector. Fuel oil is the major indirect import. On a direct basis, fish earns about $7 in exports for every $1 of imports.

3.5 Fish, A Renewable Resource?

There is widespread agreement among observers that the Philippines' waters are overfished. There is an increasing awareness of the environmental damage that aquaculture does to itself, to agricultural lands, and to coastal fisheries. There is also a growing realization that other economic activities (e.g. mining, waste and sewage from cities) damage fishing grounds. Those engaged in fishing have long been aware that some of their

practices, particularly blast fishing (using dynamite), are destructive. While there are many regulations designed to prevent these practices and consequences, few are effectively enforced.

3.5.1 Marine Fish Stocks

Fish are attracted to the relatively shallow waters of the coastal fisheries by the quantity and variety of food available. The principal determinants of the biomass are coral reefs, hard ground areas and mangroves. There is no overall assessment of the extent of damage to coral reefs, but the Environmental Management Bureau notes that " as early as 1977 the country's coral reefs (were) observed to be in progressive stages of degeneration" [EMB, 1990, p. 48]. Coral is destroyed by natural calamities, siltation (a consequence of forestry and agricultural practices), destructive fishing practices (blast fishing, *muro-ami*[4], collection of corals (for ornamental, handicraft and construction purposes), and by industrial and agricultural pollution. EMB [p. 41] notes that "the quality of the country's coastal waters rapidly deteriorated over the past decade primarily due to sewage and industrial effluent from urban areas, tailings from mining activities, oil from shipping operations and agricultural runoff".

Untreated sewage and runoff in Metro Manila is discharged into Manila Bay, one of the most intensively fished bays in the country. *Red tides*[5] have been noted in Manila Bay along with rapidly increasing *E coli* counts. The Department of Agriculture proposes to close Manila Bay to fishing before the end of 1991, a proposal expected to be strongly resisted by commercial and municipal fishermen.

Mangroves are used for charcoal, fuel wood and in house building. They have been long threatened by the expansion of coastal communities and are susceptible to damage from monsoon winds, storms and typhoons. In recent years the rapid growth of aquaculture has hastened their decline as about 95 percent of the almost 300,000 hectares of fish ponds have been formed from mangrove areas. Gomez [1988] says that in the Philippines mangrove areas have shrunk to about 25 percent of their original cover.

The impact of this loss of habitat shows up not in reduced catches, but in greater efforts to maintain volumes. For small pelagic (surface to mid ocean swimming) fish, Dalzell et al [1987] argue that the maximum sustainable yield was reached around 1975. The substantial additional investment in boats and gear to increase effort since then has been both economically inefficient and destructive of fish stocks. They suggest that "reduction of effort by about 70 percent would not lead to a reduction in catch in the long run. Rather, the catch per effort and profitability of those fishermen left in the industry would increase appreciatively." The situation of demersal (bottom swimming) fish stocks parallels that of pelagic stocks [Silvestre, 1988].

Anecdotal evidence, and the changing practices of commercial and municipal fishermen, reflect these pressures. Commercial fishermen have increased the size of their boats and fish to the limits of Philippine waters and beyond. Some even risk loosing their gear and boats by fishing without permission in the territorial waters of other nations. A "jackpot catch" used to be a school yielding 30 to 35 tonnes but now a jackpot catch is 10 to 15 tonnes.[6] Municipal fishermen now travel further from their home base to fish and spend more time fishing. The proportion of juveniles in their catch has increased over time. Data collected by the Marine Science Institute at Bolinao illustrate these trends (Figure VII 6). The diversity of adult fish and the number of fish seen

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4 Muro-ami fishing involves groups of swimmers scaring fish toward a net by banging on brittle hard coral with weighted lines. Commercial muro-ami fishing was officially banned in December 1986. The practice is popular because it is very high yielding; in one study yielding almost 8 times as much fish per man hour as the next most effective method.

5 Is a phenomenon in which floating minute marine plants with characteristic orange brown or red colour proliferate in numbers that turn the surrounding sea red. In sheltered bays with restricted outflows these blooms deplete all available oxygen dissolved in the water so killing fish and other types of marine life.

6 Conversation with Mannie Patore.

as adults have both declined rapidly, particularly on the reef slope . On both the reef flat and reef slope fish density (all sizes) is only 20 - 40 percent of the density observed on unfished coral reefs.

3.5.2 Aquaculture

Fish yields from aquaculture are relatively easier to control although economic yields, particularly from prawns, are subject to market price fluctuations. Questions about the sustainability of aquaculture arise from its interaction with agriculture and its impact on water tables. As use of chemical fertilizers and pesticides, etc. becomes more extensive and intensive, aquaculture ponds become polluted by runoff from the agricultural lands [Juliano and Baylon, 1990]. Some freshwater ponds and brackishwater prawn ponds require fresh water to be pumped from aquafiers. In many areas of the country aquafiers are being pumped out for domestic uses and for intensive prawn farming so that water table levels fall, thus allowing the intrusion of sea water in aquifers in coastal land areas [Saclauso, 1989]. Abandoned brackishwater aquaculture ponds cannot easily be reclaimed for agriculture because of their salt content.

3.6 Policies and Plans

The Philippines Government is not unaware of these problems although its efforts of regulation have little, if any, success. Over the next five years the Government's efforts are being directed by the Fisheries Sector Program which focuses on twelve major fishing areas and responds to:

- source depletion in the coastal zone;
- widespread environmental damage;
- poverty among municipal fishermen;
- low productivity of aquaculture; and
- under utilized offshore and EEZ water.

The program is funded by the Asian Development Bank and Japan's Organization for Economic Co-operation Fund. Many feel that the program, while well-intentioned, will be swamped by responses to much more powerful population and economic pressures. We note below that many efforts in the past have provided short term gains (and not necessarily to small fishermen) at the expense of sustainable increases in the well being of those to whom the project is directed.

4 SAPs & THE FISHERIES SECTOR

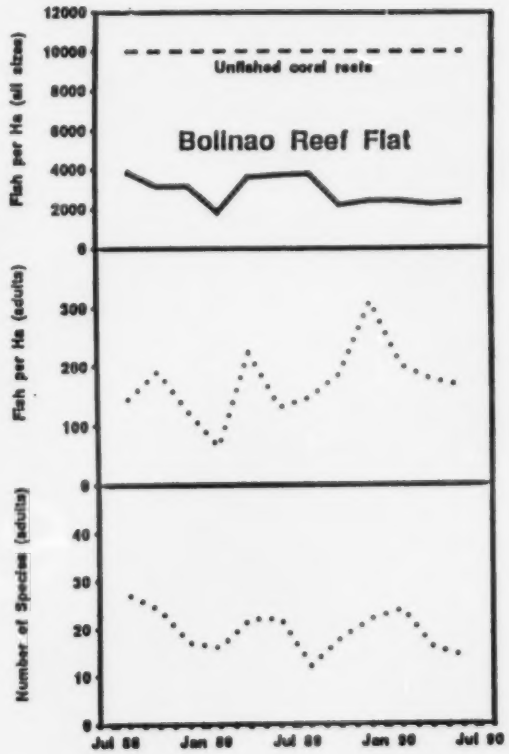
This section gives an overview of how the economic policy measures implemented under various SAPs' and SECALs' have impacted on the fisheries sector in the Philippines. The most important impact is the pressure on fish stocks from the increasing demand for fish as food, especially among communities relying on municipal marine fishing. Some of the secondary impacts are:

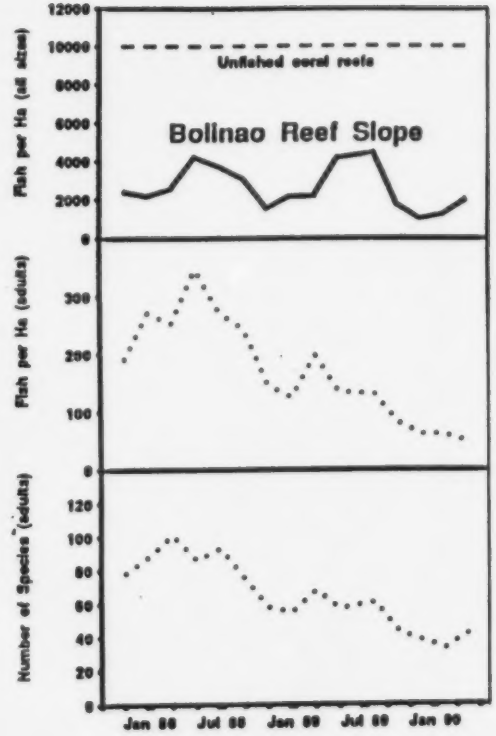
- the impact of relative price changes on real earnings of the fishing sector;
- the impact of devaluation of the peso on the prices of materials imported directly by the fisheries sector (e.g. tin plate used in canning) and imports used indirectly (e.g. gasoline used by fishing boats and fish transporter, ice made with electricity generated from imported diesel oil);
- the impact of devaluation on (peso) prices of exported prawns /shrimps, seaweed and canned tuna;
- the impacts of interest rates on investment in commercial fishing.

4.1 Fish as Food

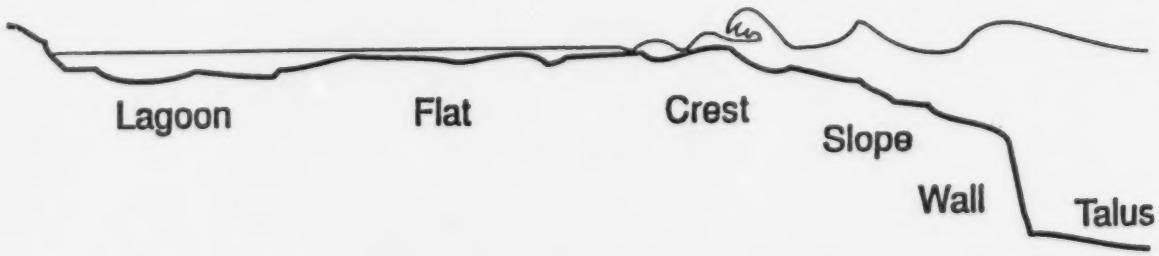
Fish is an important source of animal protein for most groups in the Philippines' society, but it is especially important to municipal marine fishing people who consume little or no other animal protein. For many of these people fishing is the primary, if not only, source of income from which to purchase rice and other necessities. It is these twin pressures that drive an increasing fishing effort in the face of declining stocks.

FIGURE VII 6 **Fish Stock Assessment, Bolinao**





Source: Marine Science Institute, Bolinao



Two efforts (prior to SAP) to improve the technology used by municipal fisherman - the *Biyayang Dagat* programs for the Development Bank of the Philippines and the World Bank banca motorization project - have compounded rather than alleviated the pressures on the fish stocks and on fishermen. The programs increased fishing efficiency. The first program saw an increase in the size of boats and increases in the sophistication of gear, mostly on boats and gear of commercial class vessels that then fished in municipal waters. The banca motorization project allowed fishermen to fish outside their "home" waters without regard to the sustainability of their catches. The projects also increased dependence upon imported inputs and so opened municipal fisherman to feedbacks from a wider range of economic measures than in the past. These are discussed below.

4.2 Real Earnings in the Fisheries Sector

Using data on production by weight and by value in the 1992-1995 Fisheries Management and Development Plan [Department of Agriculture, 1991] and the CPI data in Table VII 1, it is possible to estimate the real value of production for different types of fishing activity over the period 1981-90 (Table VII 16).

Table VII 16 shows that while the real value of total production rose over the period by 17 percent, almost all of this was explained by an increase in the real value of aquaculture production which rose by 124 percent! Real value of production in the commercial and marine municipal fisheries fell over the period, while that of the inland fishery increased from 1981 to 1984 and then fell. The large increases in production in the commercial and municipal marine sectors in the last decade, of 42 percent and 26 percent respectively, have actually led to lower gross revenues in real terms.

Table VII 17 shows that the more than doubling of nominal receipts per tonne in the commercial and municipal marine sectors were insufficient to keep up with the general rate of inflation. In real terms the unit value of their catches fell by one third over the period. Only the unit values of inland fishing and aquaculture rose, reflecting their concentration on species in high demand. Overall though, there has been a steady decline in the real unit value of fish production in the Philippines after a decade of structural adjustment.

Table VII 16 Real Value of Production by Subsector 1981-90
(millions of 1981 pesos)

	Total	Commercial	Municipal		Aquaculture
			Inland	Marine	
1991	13,954	4,125	700	6,264	2,865
1984	14,063	3,575	862	5,642	3,984
1990	16,347	3,888	803	5,243	6,412

Table VII 17 Nominal and Real Value of Production per Tonne 1981-90
'000 Peso

	Total		Commercial		Inland		Marine		Aquaculture	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1981	7.87	7.87	8.82	8.82	3.06	3.06	8.33	8.33	8.45	8.45
1984	12.33	6.76	13.03	7.14	5.26	2.88	12.71	6.96	15.20	8.33
1990	20.84	6.52	18.70	5.86	10.82	3.39	17.70	5.50	30.50	9.55

Given the large increases in the number of bancas in use in the municipal sector over the period and the declining catch per banca, one can conclude that the real value of the catch per banca has, on average, fallen by more than the decline in real unit values of the catch.

These measurements are, of course, in terms of real gross receipts. If, however, inputs rose in price faster than the CPI, net real returns will have fallen even further. It is to an examination of this that we now turn.

4.3 Adjustments to Prices of Inputs

Devaluations under the SAP program - by a factor of 3 between 1980 and 1990; reductions in the subsidy on fuel oil - so that the retail price of premium gas which had been only temporarily above P5.8 per litre in the 1980's eventually tripled within a year to P15.95 in December 1990 ; and other adjustments in prices of imported inputs, affected fisherman in a variety of ways.

4.3.1 Impacts of Fuel Price Increases on Municipal Fisherman

Table VII 8 shows that fuel and oil accounted for nearly 40 percent of the costs of municipal fisherman compared to 15 percent when the fuel price subsidy was relatively high - as it was apparently in 1987. For a given catch rate and landed price, returns to the crew where substantially lowered by removal of the subsidy.

While the catch rate has declined over the years, for a variety of reasons mentioned previously in this report, the landed prices of fish have risen. In Bolinao, where maximum (retail) prices of fish in the local market are set by the municipality, prices in 1991 were (on average) P11.5 per kilo higher than prices in 1989. We were told that landed prices paid to fishermen rose from P12 per kilo before adjustments of fuel price to P20 per kilo. At the Malabon market (the main wholesale market in Manila for fish from municipal fisheries), prices rose to cover this increase in landed prices and the increased costs of transportation.

We cannot say whether the adjustment in landed price offset entirely the extra costs from reducing the subsidy on fuel prices. If we can interpret the figures from Table VII 8 as confirming a return to the margins of 1981, then fishermen have not been fully compensated because the real value of their earnings will be lower if they buy anything in which fuel is a direct or indirect input.

Municipal fishermen have also seen the price of ice increase and the dependability of its supply worsen. Ice making depends upon electric power generated from imported diesel oil, and power is increasingly in short supply.

4.3.2 Impacts on Aquaculture

While we do not have figures to illustrate the point, the costs of prawn farms would have risen since SAP measures because they are intensive users of electric power. Of itself this may not have adversely affected profits of prawn farmers as world prices in dollar terms rose and the 1988 devaluation would have increased their peso earnings. However, it is reported that since 1988 prawn farmers' overall profits have suffered because dollar prices have declined due to increasing pressure from competitors. Even with devaluation, local currency prices of prawns fell by 14.5 percent in 1989 and were still below 1988 levels in 1990. Profitability is also reduced by low productivity in the Philippines prawn farms relative to that of their competitors, and by problems with disease.

The cost of the imported fishmeal used for feed has risen, and this is not entirely made up by an increased sales value because much farm reared fish is sold locally. Peso prices may have risen to partially accommodate this increased cost in much the same way as the impacts of fuel price increases on municipal fisheries have been accommodated, but, it is quite likely that the real incomes of those in aquaculture have decreased.

4.3.3 Impacts on Fish Canners

The over-fishing of municipal waters appears to have driven an increasing number of municipal fishermen into fishing for tuna, increasing the supply of whole fish to the canners. This has not been an ambiguous benefit, although it may have made some contribution to what is now described as "over capitalization of plants" and "over optimism regarding sustainable yields" [RDA, 1990, p. 28] in the canning industry. Supplies of locally caught tuna are seasonal, so to operate year round, a canning factory has to import tuna during the typhoon season in the Philippines. For sometime canners paid tariffs on fish imported for canning (the impact on cost of these probably being offset by export credits). These tariffs have since been reduced in the last few years, but canners still describe the world prices they are now paying for whole fish as "high" [RDA, 1990, p. 39].

Local supply from the banca fleet, while relatively plentiful (although becoming less so) is generally below export quality because of its size and the difficulties in delivering it frest to the canneries. The canned product is sold on the downscale local market for about P5 per tin.

"Exact figures are not available but the cannery margin is believed to be quite small" [RDA, 1990,p. 36]. Export grade canned tuna comes primarily from fish caught toward the limits or beyond the Philippines EEZ. While this fishing appears to be quite profitable for fleet operators, canners in the Philippines' contend that their break-even price "is close to US$22 per case. If so, they are in a deficit situation" [RDA, 1990, p. 36]. The canned tuna market is very competitive. This mitigates the increase in export prices (in pesos) which may have been matched or exceeded by the increased peso price paid for imported fish and for imported tin plate.

4.4 Effect of Devaluation on Export Earnings

Devaluation of the peso has increased (in pesos) the export earnings from prawns and tuna but, as suggested above, the net benefits to these heavily import dependent industries may not have been large. However, seaweed farmers use few imported inputs and therefore appear to have benefited virtually without qualification. Seaweed processors used imported inputs in transport, powdering and packing, but drying is by the sun. Hence devaluation has increased unambiguously the earnings of seaweed processors, encouraged expanded production, and led to dedicated collection systems.

4.5 Interest Rates

While credit is pervasive throughout the fishing industry, it appears that interest rates in municipal fishing are set by custom and the local economy and are not greatly influenced by macro economic policy (i.e. interest rates in this informal sector are separable from interest rates in the formal economy). Those who seek bank credit, such as fish canners and fishermen seeking to import or build larger fishing vessels, have been affected by the increase in interest rates since 1984.

Fish canners complain of "high domestic interest rates (of 25 - 30 percent) for the purchase of local fish" [RDA, 1990, p. 28]. Two people we spoke to (Moralles/BFAR and Paterno) said that investment in commercial fishing vessels had been adversely affected by interest rates, Paterno indicating that an import levy scheme (requiring an importer to put up 100% of the value of any boat to be imported even though it may take a year to deliver) was a substantial dis-incentive to investment.

5 LESSONS/ISSUES FOR FURTHER STUDY

While it is beyond our terms of reference (and our competence) to independently evaluate the scientific evidence for declining fish stocks in the coastal waters of the Philippines, we saw or heard nothing contrary to that view; the coastal and perhaps much of the EEZ of the Philippines is over-fished. Because fish and fishing are so important to the Philippines, projects or programs to "help" this sector must decrease pressure on fish stocks, not increase

pressures as has been the experience with programs in the past. The fishery sector program that is to be launched with the support of the Asian Development Bank and Japan's Overseas Economic Co-operation Fund (section 3.6 above) recognizes these issues. Experience suggests that a great deal of attention to the details of implementation and close monitoring of actual performance, with a capacity for rapid changes in the programs if the targets are not being met, is warranted.

Such monitoring would be helped by studies that focus on the interaction between production and economic returns. There is a great deal of information about fisheries and fishing but few studies of the economics of fishing - of the ways in which fishing families and fishing villages respond to changes in prices of inputs/outputs and other economic "signals". ICLARM's study of the economics of fishing in San Miguel Bay could be both repeated and replicated. Studies of fish catches and fish stocks could be complemented by studies of the economies within which fishermen and their families operate. These sorts of studies require close observation over a long period of time.

It would also be helpful to have a clearer idea of how income is distributed by class, group and gender in this sector. This would entail analysis of ownership of assets, of prices, margins and costs in the catching, processing and marketing of fish.

Support for such research is likely to be forthcoming from government and the expertise exists localy for joint-research if funding is available from overseas.

VIII CONCLUSIONS

The most striking finding of the three case studies is the dynamism of the fisheries sector, in particular the substantial increases in the production of fish since the beginning of the adjustment programs. In Senegal and the Philippines, it has been the domestic market which has fuelled this growth, while in Chile, the export market has clearly been the driving force. In all cases, though, export earnings from fish in dollar terms have risen strongly, stimulated by devaluation and other incentives. Employment in the fisheries has also grown steadily in all three countries.

The most critical implication of this growth, is that it is now acknowledged to be putting pressure on the resource base in each of the three countries. Indeed, given the uncertainty surrounding the accuracy of fishing statistics, the degree of pressure on the resource base is likely under-estimated. Regulation of fishing activities, especially by foreign fleets, and monitoring and policing the resource users generally, have assumed much greater urgency. At the same time, however, state fiscal resources available for this task have been cut back as part of adjustment policy, so that concerns are increasing that governments will not be equal to the task.

The evidence that growth in the industry is now pressing up against natural limits is, at this point, tentative, impressionistic and even anecdotal. But there are so many signs, in terms of both over production and pollution, that they cannot be ignored. Productivity is stagnant or declining in all three countries and has been for some time in both Senegal and the Philippines.

Causation is not straightforward though. Since domestic consumption of fish is relatively insignificant in Chile, and growing apparently only at the growth rate of population (1.3 percent per annum), one can say with some confidence that the adjustment program has been primarily responsible for industry growth and the recently felt pressure on the resource base. Growth was due to a combination of export incentives and the relative attractiveness and accessibility of the industry to small producers facing poorer economic prospects elsewhere. Falling real wages and rising unemployment were certainly factors improving the profitability of industrial fishing and processing and stimulating the movement into artisanal fishing.

In both Senegal and the Philippines, where local per capita consumption levels of fish are 6 to 8 times those of Chile, and where population growth rates are much higher (3.2 percent per annum and 2.7 percent per annum respectively) most of the increased catch went to local markets. It is difficult to assess the role of macro economic policy in the growth of local consumption but the recovery of overall GDP growth must have played some role in the buoyancy of fish consumption in total. Likewise, the easing of foreign exchange constraints reflected in rising volumes of imports, in Senegal in 1988-87 and the Philippines post 1986, appears to have facilitated expanded outputs of fish. Yet other factors, less directly related to macro policy also assisted, in particular, loan schemes for motors and other inputs.

Export promotion policies appear to have been successful in all three countries both in raising total sales and in diversifying export products e.g. seaweed, prawns, new varieties of frozen products. There is some evidence though that world prices of some of these products have weakened as a result of supply increase. Even in Senegal, export earnings rose despite the claim that the restricted ability of the government to use exchange rate policy, except through the cumbersome manipulation of import taxes and export subsidies, kept incentives down to a minimum. Yet it is in Senegal, in particular, that there are signs of conflict over resource use between

artisanal fishers catering primarily for the domestic market and industrial fishers producing for the export market. This conflict may have been precipitated in part by the need to raise output to compensate for stagnant or declining real prices of fish. Greater export incentives can only have the effect of enhancing friction and putting even greater pressure on the resource base. Current plans for the sector seem not to recognize the implications for artisanal/industrial competition, nor for the resource base. The plans to create a national trawler fleet, in particular, while justified on the basis of an ageing fleet and a desire for a greater national presence in this key industry, would have to be executed very carefully to avoid these problems and it is not clear that the management capability exists to achieve this. In Chile there is growing competition between artisanal and industrial sectors in the growing of seaweed.

It is to be noted that the age and condition of both the fleet and the processing factories is less a problem in Chile where the export orientation of the industry has permitted high profitability and modernization. In both the Philippines and Senegal, where export incentives have been more limited and where in the case of the former, the local market is important in commercial fishing, real returns have fallen and capital investment has been a problem which has not been addressed by macro economic policy. It is for this reason, perhaps, that declines in productivity were more pronounced there than in Chile, at least until very recently. Now, as the resource limit is approached, excess capacity is becoming evident both in Chile and the Philippines.

Lack of access to credit, both for short term working capital and for longer term capital purchases were reported to be problems in all sectors of the industry in Senegal but less of a problem in Chile and the Philippines. Complaints about high interest rates were common and may have had validity in the Philippines but in Senegal, where rates were in any case much lower, there is no evidence of this being a major problem.

Austerity measures in adjustment programs had a noticeable impact on fish consumption in Chile 1973-75 and in the Philippines 1983-86. In the former, removal of subsidies on fish consumption had a major impact but the huge drop in real wages must also have been a factor. In the latter, falls in GDP and in real wages were the cause. Once this phase was passed through, the fisheries sector grew steadily, contributing to output, foreign exchange earnings and employment growth.

There are clear limits to how much light one can throw on the impact of structural adjustment measures on the fisheries sector from secondary sources and brief on the spot visits. In the longer term, more systematic research is needed. Priority areas would seem to be:

For Senegal -

(i) the implications for domestic consumption of fish of recent efforts to further stimulate fish exports,

(ii) the distribution of income within the fisheries sector, and

(iii) how structural adjustment policies generally have affected fishing communities;

For the Philippines -

(i) how best to reduce pressures on fish stocks,

(ii) the structure of costs and returns in different sub-sections of the industry, and

(iii) the distribution of income within the fisheries sector;

For Chile -

(i) the structure of costs and returns in different sub-sectors of the industry,

(ii) the distribution of ownership and income within the fisheries sector,

(iii) the strategies adopted by different sub-sectors in response to changing opportunities and constraints, and

(iv) the identification of factors restricting incomes in the artisanal sector.

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APPENDIX I

TERMS OF REFERENCE

1. The overall objective of the proposed study is to evaluate the impacts of SAPs on the fishery sectors of Third World countries. Since the advent of the new ocean regime, coastal countries with significant fishing resources have instituted measures to protect and at the same time obtain economic rent from the exploitation of their fishery resources. This is even more so for Third World countries which have come to depend on their fishery resources as a source of relatively cheap protein supply, employment, and foreign exchange earner.

2. At the global level, fish supply plays an important role as a source of animal protein; and as the world's population increases, and as other sources of animal protein supply become scarce, Third World countries in particular will focus more on their fishery resources to meet their increasing demand for animal protein. In the context of SAPs, there are some implications for the fishery resources of Third World countries. Chief among these are: the risk of overfishing the major commercial fish stocks because of the desire to provide food for increasing populations and to increase foreign exchange earnings with all its biological and economic consequences, and the need to create a balance between investment in the fishery sector and in other sectors given the nature of Third World countries' economies. More specifically, the first section of the proposed study will:

    a) Evaluate the importance of the fishery sector from a global perspective, and then in terms of the economies of major seafood producing countries in the developing regions. A number of indicators such as the volumes and values of seafood production and trade, percentage contribution to animal protein supply, employment creation, foreign exchange earnings and rural development will be presented and discussed.

    b) The link between seafood production, the availability and pricing of inputs and the pricing of outputs will be discussed in terms of the impacts of the policies of SAPs. Given that inputs are more expensive under SAPs due to exchange rate re-alignment, it is important to know how this affects fish production and whether there are any resulting input substitution. The availability of foreign exchange for imported inputs is also of major concern. This is directly related to the choice of technology and to the basic organizational unit of operation and structure of the fishery sector.

    c) Factors such as whether changes in production as a result of SAP policies increases the fishery sector's contribution to GNP, and whether more foreign exchange is generated (in the case of seafood exports) than that needed for the imported inputs will be considered.

d) Tariffs also increase the prices of imported inputs. This analysis will consider whether there is evidence of any net social welfare benefit or loss as a result of the liberalization of trade.

e) Overvalued currencies have also been given as one of the factors creating disincentive to production increases. The proposed study will consider whether SAPs policy in re-aligning exchange rates with respect to countries' terms of trade create any incentive to increase production in the fishery sector or whether other factors are more critical for production to increase. This will be analyzed in terms of the open access and renewable nature of fishery resources. It is also likely that high marketing and transaction costs lowers the gains achieved from higher product prices due to exchange rate re-alignment, thus reducing the intended impacts of this policy. This paper will discuss whether trade liberalization merely shifts the incentive for rent seeking and how it affects the fishery sector.

f) It is also important to analyze the socioeconomic structure of fishing communities to determine how they are affected by SAPs. Three broad sub-sectors can be distinguished: aquaculture, artisanal (small-scale) fisheries and industrial fisheries. The impacts of SAPs are felt to varying degrees in these sub-sectors because of the different nature of their activities. The aquaculture sub-sector depends to a large extent on imported technology and is therefore susceptible to the availability of such technology. The artisanal sub-sector is labour intensive, in most cases uses significant imported inputs, and is dispersed along isolated coastlines and river banks in rural areas. These characteristics combine to make this sub-sector the most vulnerable of the three sub-sectors when SAPs do not work well. The industrial sub-sector is capital intensive and relies almost entirely on imported inputs. However, this sub-sector has more flexibility to adjust to the impacts of SAPs policies because for the most part foreign interests are involved. The proposed study will concentrate mainly on analyzing the impacts on the first two sub-sectors. Factors such as income distribution, appropriate technology, labour mobility, migration, capital transfer, among others will be discussed. It will also investigate how other external factors not related to SAPs policies affect the performance of these sub-sectors.

3. The objectives of the second section of this proposed study will present case studies on the impacts of SAPs policies on the fishery sector of three major fish producing countries in Africa (Senegal), Asia (the Philippines), and Latin America (Chile). The case studies will include reviews of the performances of the fishery sector in these countries prior to, and following the implementation of SAPs (if possible), detailed evaluation of the sub-sectors in terms of annual trends in fish production and seafood trade (domestic and foreign), returns to individual fishing units or groups, estimates of imported inputs in terms of foreign exchange requirements, contribution to national income and employment, and contribution to foreign exchange earnings.

APPENDIX 2

LIST OF PERSONS CONSULTED - PHILIPPINES

Organization	Name(s)
Bureau of Fisheries & Aquatic Resources Department of Agriculture, Quezon City, Metro Manila	Guillermo Morales Head, Project Management Office, Fishers Sector Program
	Mrs. Natividad Lagua Assistant Director
	Mrs. Anselma Legaspi Chief, Support Services Division
	Atty. Romeo de Sagun Chief Legal Division
Bureau of Agricultural Statistics Department of Agriculture, Quezon City, Metro Manila	Ms Erlinda Ramos Chief, Fisheries Statistics Division
Department of Environment and Natural Resources, Quezon City, Metro Manila	Ms Ella Deocadiz Assistant Director Environmental Management Bureau
Marine Science Institute, University of the Philippines, Diliman, Quezon City, Metro Manila	Dr. Gavino Trono, Jr. Professor
	Dr. Edgardo Gomez Director
	Dr. Nemesio Motaño Assistant Professor
	Dr. Ramon Clarete Professor School of Economics
ICLARM, Makati, Metro Manila	Dr. Joseph Padilla

National Commission of Women San Miguel, Manila, Metro Manila	Mr. Rudy Aldiano Administrative Officer
	Ms Cherry Diaz Environmental & Natural Resources Sector
Food and Nutrition Research Institute epartment of Science and Technology Manila, Metro Manila	Mrs. Patricia de Guzman Assistant Director
	Mrs. Wilma Molano Supervising Research Specialist
Navotas Fishing Port, Navotas, Metro Manila	Mr. Jose Sapinoso Assistant Port Manager
U.P. Marine Science Institute, Bolinao, Pangasinan	Dr. Liana McManus Head, Marine Station
University of Rhode Island (CRISP) Bolinao, Pangasinan	Dr. John McManus U.P. Marine Science Institute Scientist
Bolinao Fishermen and Fish Dealers Association (BOFFIDA) Bolinao, Pangasinan	Mr. Jesus Celeste President

LIST OF PERSONS CONSULTED - CHILE

U.S. Embassy Santiago	Carlos Capurro Natural Resources Advisor
PROChile Santiago	Rose Marie Bedecarratz Chief, Fishing Sector
CORPESCA (Fishmeal Exporters Association) Santiago	Jose Raúl Cannon Advisor
IFOP Santiago	Sara Cabrera Christian Potócnjak

CONAPACH (National Confederation of Artisanal Fishermen) Valparaiso	Humberto Chamorro President
Prodelmar Valparaiso	Gerardo Schiller President/Manager
Escuela de Ciencias del Mar Universidad Catolica de Valparaiso	Maria Angela Barbieri
	Patrico Arana
	Rene Cerda
	Teofilo Mela
SUBSE Valparaiso	Hector Bacigalupo Maximilialio Alarma
Pesquera Catalina S.A. San Antonio	Peter Wadsworth President
Universidad de Concepcion	Arcadio Cerda
	Rosita Aquilera
	Marco Antonio Retamal
	Olga Mora
	Alvaro Espinoza
FUNCAP Coronel	Jorge Valenzuela
	Victor Pantoja
Pesquera Iquique S.A. Talcahuano	Alejandro Gutierrez Chief of Canning and Freezing
Pontifica Universidad Catolica de Chile Sede Regional Talcahuano	Eduardo Tarifeno

Universidad Austral de Chile, Puerto Montt	Fernando Berroeta
	Aurora Guerrero
	Carlos Jimenez I
	Eduardo Yeager
Federación de Pescadores Artesanales, Puerto Montt	
Cooperativa "Mare nostrum" Pichicolo, Puerto Montt	
Sindicato Pescadores "Estapuilla", Puerto Montt	
Sindicato Huelden, Linao, Chiloe	
Federación Algueros de Ancud, Ancud, Chiloe	
Sindicato Encarnadoras de "Calbuco", Calbuco	

LIST OF PERSONS CONSULTED - SENEGAL

Centre De Recherches Océanographiques de Dakar-Thiaroye	Kebe, Moustapha
Direction de L'Océanógraphie et des Pêches Maritimes	Diop, M. Directeur
Ministère de L'equipement, des Transports et de la Mer	Dioh, Dr. Bernard
	Ba, Boubacar Conseillers Techniques
International Development Research Centre	Lavergne, Réal
Département de la Statistique, Gouvernement du Sénégal	Fal, Babaka
Caisse Nationale de Crédit Agricole Sénégalais	Ndiate, Yoro Diaw Coordinateur

Servi-Pêch	Beauchesne, Pierre
	Lagacé, Michel
ATEPAS	Pinard, Yves
Propêche	Samba, Alassane
World Bank	Amar, Sangoné Operations Officer
Groupement des Armateurs et Industriels de la Pêche au Sénégal	Coulibaly, Dougoutigui Economiste - Gestionnaire, Secretaire Général Permanent
Bureau Pour L'Afrique Occidentale - UNICEF	Bérard, Jacques Chargé du Suivi et de L'évaluation
Centre Recherches Océanographiques de Dakar-Thiaroye	Gueye, Lamine Chef de Secteur - M'Bour
AB Consultants	Tall, Cheikh Oumar Tidiane Administrateur Délégué
Caisse Centrale de Coopération Economique	Vivasord, M.
Groupement des Amateurs et Industriels de la Pêche au Sénégal	Seck, Saër Secretaire Généal
Various fishers, buyers, processors	
Port de Thiaroye	Artisanal fishers and buyers Processors
KAYAR	President and Vice-President of the GIE (Groupement Intérêt Economique) Mantulaay Géen de transformation de produits halieutiques
M'Bour	Processors

APPENDIX 3

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